Engineering News-Record

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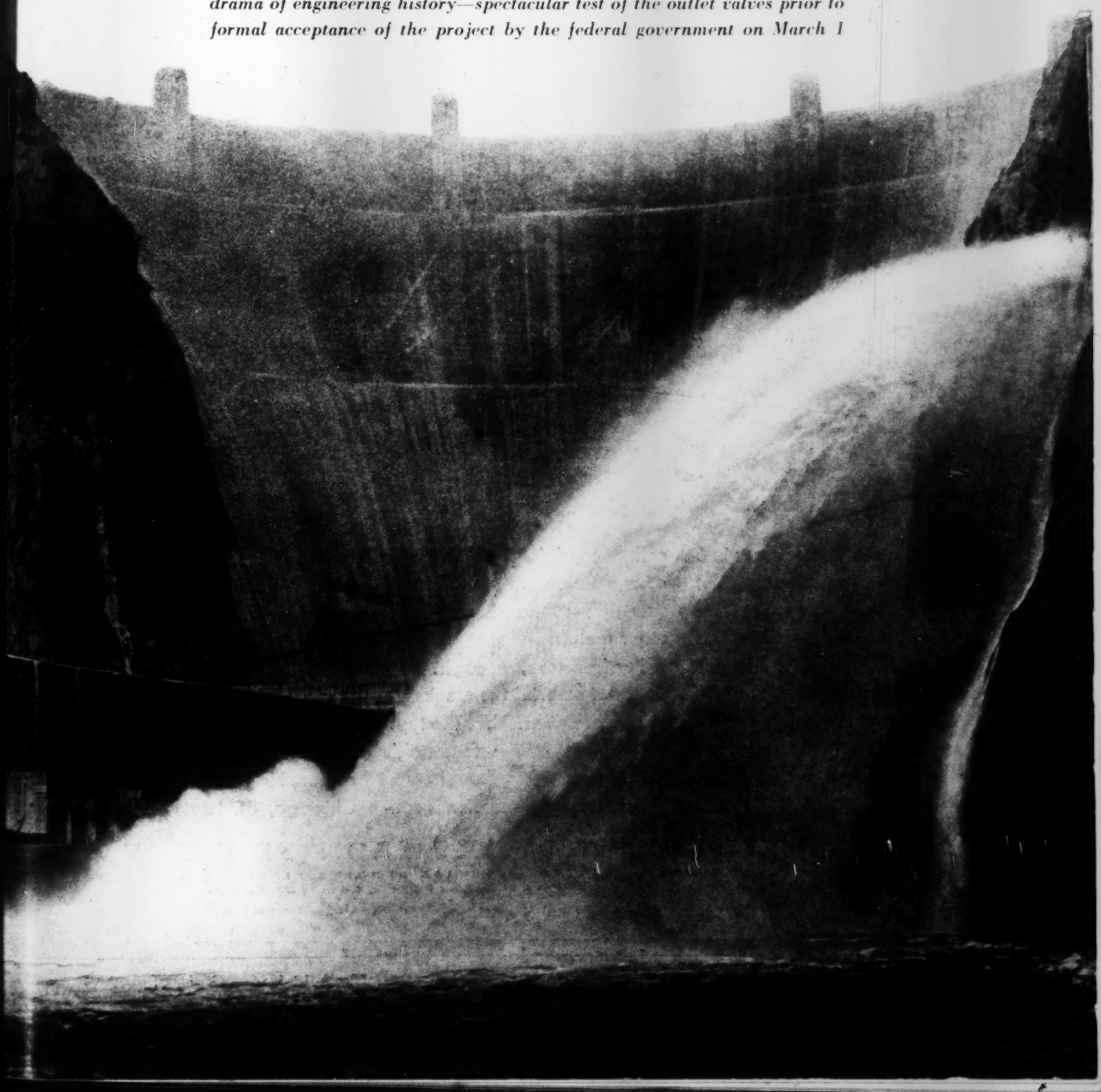
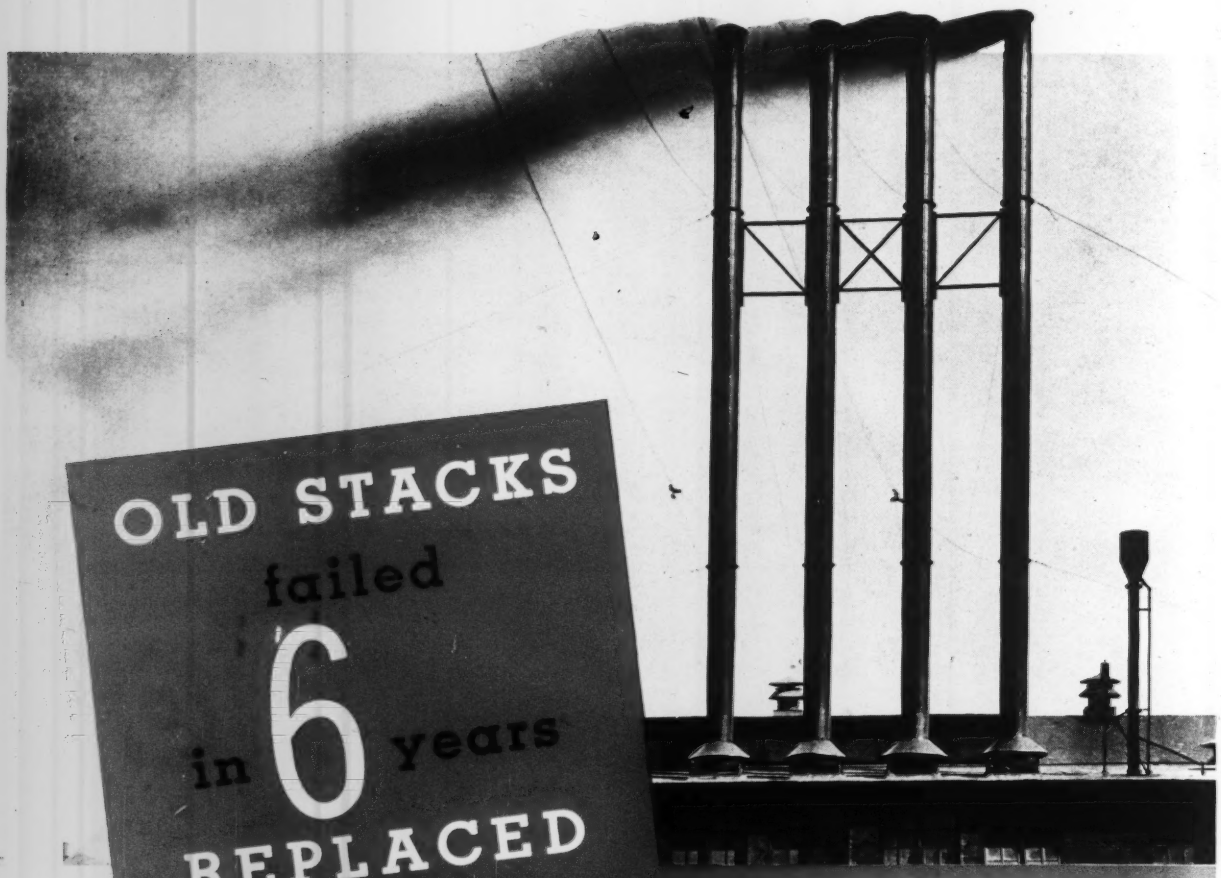
Boulder Dam forms the back-drop for one of the last scenes in a great drama of engineering history—spectacular test of the outlet valves prior to formal acceptance of the project by the federal government on March 1





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● *Illustration shows welded wrought iron stacks on the Austin, Minnesota, engine-house of the C. M. St. P. & P. R. R.*

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A MOMENT WITH THE PUBLISHERS

Don't Turn the Clock Back

THOSE who have at heart the welfare of highway improvement will do all they can to insure rejection by Congress of the President's recommendation that the regular Federal Aid appropriation, authorized for the year ending June, 1937, be cancelled and made applicable to the following year.

Because of delays in getting construction under way last summer, caused chiefly by late legislation and work-relief regulations, balances now available are said by those who favor the change to make unnecessary the regular appropriation authorized for the year beginning next July.

Such reasoning ignores the fact that the $125,000,000 annually contributed by the federal government toward highway construction is an essential part of the very important institution known as Federal Aid to highways. Whether or not funds on hand can be made to last until June, 1937, and they should *not* be, the chief significance of the annual federal appropriations is their substantial guarantee of continuing federal participation in the highway improvement of the nation. As such, their symbolic value far transcends that of the funds involved.

WITH the advent of the depression and the adoption of highway construction as an emergency employment measure, this annual appropriation was permitted to lapse. But, although much larger appropriations were made for highway construction by the emergency acts, those most concerned over sound highway policies exerted every effort to reestablish the principle of annual federal appropriations to be matched by the states. This was accomplished in 1934 by the Hayden-Cartwright Act which not only reestablished the principle but also authorized appropriations for the ensuing two years. It is one of these authorizations that the President would cancel.

The establishment in 1916 of a federal participation in highway improvement through the Bureau of Public Roads probably was the most salutary single event that has happened to highway development in this country. It is no disparagement of the splendid work done by some state highway departments, both before and after that event, to appraise the coordination of routing, design, construction and inspection achieved under the supervision of the federal bureau as a most potent influence for sound highway practice in every state of the union. Not only has it made for higher technical standards; it has helped also to keep the administration of vast highway expenditures during the last twenty years on an amazingly high plane of integrity and efficiency.

In large measure this may be attributed to the control exercised through the disbursement of the regular Federal Aid appropriation. The continuation of this stabilizing influence touches the interest of every citizen; it may mean far more to him than his share of the $125,000,000 by which it is made possible.

So implicitly has the regular Federal Aid appropriation been accepted by the highway industry as a guarantee of its stability and continuity, that the passage of the Hayden-Cartwright Act evoked an immediae response. State highway departments tuned up their organizations and planned ahead with confidence that normal continuity had been reestablished; contractors purchased new equipment in expectation of a resumption of normal employment; manufacturers of materials and equipment improved their plants and products, their efforts culminating in the inspiring Road Show at Cleveland, the first since 1933. All this revival in a far-flung industry was born of the confidence that highway improvement had been redeemed from the emergency hand-to-mouth category to which it had been temporarily relegated and reestablished as a continuing, productive public function.

AT THIS writing, indications are that the President's proposal will not prevail and that the regular appropriation will be made as originally authorized. It is to be hoped that this is so; any other course would cancel out much of the progress of the last twenty years; it might well help to divert highway improvement into a course that eventually would lead it to the depths of log-rolling and pork-barrel administration.

But until the appropriation finally is enacted into law, those who stand for sound highway policy will be wise to see that their Washington legislators know their desire that the regular Federal Aid appropriations should not again be interrupted, even for a single year.

Willard Chevalier

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It Cost Too Much *to use the old stuff!*

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Flood control in the delta of the Rio Grande is an engineering problem with many unusual elements, not the least of which is its international character. Next week's issue will tell how engineers of the international commission, working with the county engineers, have already done much with the limited means at their command.

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ENGINEERING NEWS-RECORD

March 12, 1936

FIG. 1—REMARKABLY LONG SPANS of bypass gas mains are carried across subway excavation by suspension cables on steel towers. Photograph was taken in 1930.

The Hazard of Live Gas Mains in Subway Construction

Evolution of New York subway construction practice from open trenches to roofed cuts has developed special procedure for eliminating serious gas-main breaks and explosions

By William O'Leary

Formerly Structural Designer, With Board of Transportation, New York City

NEW YORK CITY, with scores of miles of under-street passenger railway completed and now beginning more miles, has perfected to a high degree its practices for handling the buried services in the path of construction. Methods of bypassing and relocating sewers were described in *Engineering News-Record*, April 18, 1935. In a similar way means have had to be devised for preserving water, telephone, electric power and other service lines and conduits. So vital and expensive is this work that special divisions of experts have been set up to supervise plans and construction. All of these subsurface changes involve serious hazards of interrupted service, and in some cases property damage, if they are not properly conducted. In the handling of gas mains there is also the danger of generating a dangerous explosive if breaks or even leaks in the conduits should occur due to mishandling, and present practice considers no alternative but complete removal from the zone of active danger. The principles and practices followed and how they came to be evolved make a vitally interesting story, which is told in the following article. —EDITOR.

ONE of the many problems encountered during the construction of subways and tunnels in large cities is the temporary care of gas mains along the route during the construction period. In the early days of subway construction the importance of this problem was not sufficiently realized, and as a consequence serious explosions occurred with great loss of life and property.

Ordinary illuminating gas when mixed with air forms a very explosive compound and needs only a spark to ignite it. A 10 percent mixture of gas and air will ordinarily suffice to produce this explosive compound. The igniting spark may be furnished by the underground trolley of a surface railway, by one of the many cables exposed during the excavation of the subway, by a discarded lighted match, by cigarette or cigar butts not wholly extinguished, by sparks from construction equipment or by blasting. The violence of such explosions has been amply demonstrated in the past.

Early accidents give warning

The most serious gas explosion in this country in connection with subway construction occurred on March 4, 1897, at the corner of Boylston and Tremont Sts., Boston, Mass. This explosion resulted from a leakage of gas into an excavation between the top of the completed subway and a temporary bridge upon which the streetcars and other surface traffic were being carried. Six persons lost their lives at the time, and four died afterward. Many others were injured. The property damage amounted to about $1,000,000. It was not the practice at that time to "kill" the gas mains carried through the subway cut—that is, to stop the flow of gas through the mains.

The only explosion of gas worthy of note during the construction of the New York subways occurred on March 8, 1914, at 23d St. and 5th Ave., Manhattan. A break in a 48-in. water main in 5th Ave. at a point about 50 ft. from the sheeting line of the subway then being constructed had undermined a 6-in. gas main in 23d St., causing it to leak. The gas formed in pockets and was ignited by a spark from a surface car. Considerable damage was done to windows in the vicinity and to subsurface pipes and cables in West 23d St. No one was killed. Those in the streetcar suffered from shock. This explosion was not directly attributable to subway construction, as all gas mains

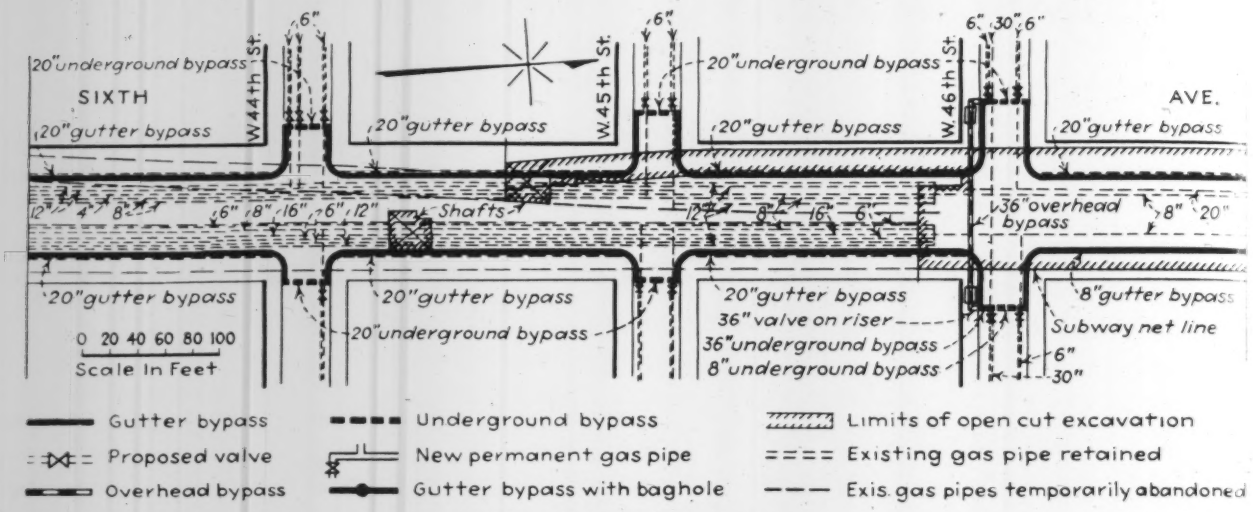


FIG. 2—IN BUSINESS STREETS gas bypass mains laid along the curbs with overhead or underground connections at intersecting streets preserve light and sidewalk room. These are plans for new Sixth Ave. line.

in the area of subway excavation had previously been killed and bypassed.

Bypassing evolves gradually

When subway construction was first undertaken in New York City, it was not the practice to deck the streets through which the subway passed; only at street intersections were bridges required. All subsurface structures were supported in the cut, usually by hanging them from timbers and crossbeams. Consequently, gas mains were not killed, as it was considered that any leakage would not constitute a danger because ample ventilation was obtainable.

On the first subway contracts, construction was carried on in open cut, decking being provided only at street intersections. Gas mains in a live condition were maintained in the cut. The subway built by these methods was known as Contract 1. For the next large subway route built, known as Contract 2, it was decided to deck the streets during construction. Since complete decking would limit the ventilation of the space beneath, the bypassing of all gas mains was ordered; arrangements were made with the gas companies to lay two temporary mains on trestles over the sidewalk for the entire length of the work. On some sections of this work gas bypasses were also laid in the gutter against the curb. All house services were connected to these surface gas bypass mains.

The same general method of gas bypassing was employed on Contracts 3 and 4. When mains crossing the subway excavation could not be cut out of service temporarily, gas bypasses were built over the street on cable suspension, or in the case of small pipes they were carried across under the decking. All connections between the permanent gas mains and the temporary bypass pipes were located far enough back from the sheeting line in solid earth to avoid the danger of a break if a slide or cave-in occurred.

In mains to be killed the flow of gas is first stopped by inserting bags in the pipes through a small hole known as a bag-hole. These bags are inflated and the stems tied. Pressures in the live mains adjacent to the bags are then taken at intervals, and if satisfactory pressure can be maintained the longitudinal mains are cut off and capped at intervals of two blocks. In the meantime the bypass pipes are laid in the gutter or on overhead trestle, as the case may be, and connected. The bypass pipes are carried back in the transverse streets, the turn at the curb being made either by a pipe bent to fit the radius of the curb or by short straight welded sections. The pipes in each transverse street are then connected to what is known as the header bypass, a valve being placed at each

FIG. 3—OLDER PRACTICE employed square towers of wood to carry overhead-cable-suspension gas-main bypasses. Photograph was taken in 1917.

connection. This header pipe crosses the transverse street underground at a safe distance from the sheeting line. Sometimes, if there are many small pipes in the transverse street, they are connected together and only one connection is made to the header bypass for each group so joined. This reduces the number of valves required.

The principles of gas bypassing and the specifications therefor underwent some modification as successive contracts for new sections of subway were awarded; previous experience necessarily led to improvements. These modifications and changes, constituting present practice, are as follows:

1. About 1920 the specifications were changed as to the kind of material to be used for the bypass pipes. Wrought iron was no longer called for, steel being uniformly designated; this change was in the interest of economy, there being no advantage in the use of wrought iron for this purpose.

2. Pipes transverse to the subway were no longer permitted to be carried under the decking but were required to be placed overhead on trestle or cable suspension. This stipulation was adopted at the request of the gas companies, as a further safeguard against possible explosions.

3. The header bypass in transverse streets to which the mains in that street were connected was required to be placed on a line determined by the intersection of a plane at a slope of 1 on 1 from the bottom of the sheeting line, with the pipes to be killed. This rule was adopted to guard against earth slides, causing a possible break in the live gas mains.

4. Towers for overhead trestles or cable suspension transverse to the subway were required to be so placed that the bases of such towers would be back of a line determined by a plane on a slope of ½ horizontally to 1 vertically, measured from the bottom of the sheeting line.

5. Payment for the support of overhead bypasses by cable suspension was changed by requiring that the payment would be according to the number of linear-feet from out to out of towers instead of, as previously, from out to out of anchorages. This modification was brought about by the tendency of the contractors to place the anchorages for the cables at an unreasonable distance from the towers, in order to secure a larger payment.

FIG. 4—LATER PRACTICE turned to A-frame towers for cable-suspension overhead-bypass gas mains. Photograph was taken in 1926.

6. Each pipe in a transverse street or series of pipes connected together was required to be connected to the header bypass with a valve placed before the connection.

7. A valve was required to be placed on trunk or distribution mains in transverse streets at points about 150 ft. from the sheeting line.

8. The use of extra-heavy pipe for gas bypasses was discontinued, but this weight of pipe was specified for the bends at corners on account of the extra hazard of vehicles striking the bypass at this location.

9. Vertical clearances for overhead bypasses were maintained at 14 ft., except where trolley wires interfered, in which case they were set at 19½ ft. On streets traversed by double-decked buses the necessary clearance must be determined beforehand and specified. In many instances bypasses are carried over elevated railway structures; here again the clearance must be determined in the field and specified.

10. In certain business districts the practice of placing large mains on trestles above the sidewalk was opposed by business interests. As a consequence larger gutter bypasses up to 24 in. in diameter are now provided, suitably protected and provided with pedestrian bridges and ramps. This eliminates the unsightly timber trestles and allows more light to stores and business places.

Fig. 2 illustrates the latest method of gas bypassing in a business district in Manhattan, where longitudinal surface bypasses 20 in. in diameter and transverse overhead bypasses up to 36 in. in diameter are being used. The large surface bypass mains are placed in gas-tight boxes at the curb line, with timber guards so placed as to prevent the wheels of vehicles from striking the pipe.

The combined capacities of the two longitudinal bypasses are made about equal to the combined capacities of the

FIG. 5—BYPASS GAS MAINS carried along the street on over-sidewalk towers now very generally are replaced by mains along the curbs, as indicated by Fig. 2. Photograph was taken in 1926.

existing longitudinal gas mains. The same procedure is followed in the case of transverse mains. Trunk mains, of course, carrying higher pressure than the ordinary mains, are treated separately. The capacities of pipes carrying illuminating gas vary as the 5/2 power of their internal diameters.

Various overhead methods available

Most of the more serious and intricate problems in connection with the temporary bypassing of gas mains are encountered in carrying the pipes over subway cuts either transversely across the cut or longitudinally along the cut, either directly over it or on one side of it.

Cable Suspension—When conditions are such that it is possible to place towers in such positions that their bases will be back of a line determined by a plane on a slope of ½ horizontally to 1 vertically, measured from the bottom of the sheeting line, cable suspension is usually employed, provided ample space is available for anchorages.

Early overhead bypasses of the cable suspension type were exclusively supported on timber towers such as is shown on Fig. 3. Timber towers were also used extensively during the construction of the city-owned Independent Subway System. Both the box-frame type of timber tower and the A-frame type were used. The latter type was usually called for where the span was long and the overhead clearance greater than 14 ft.; Fig. 4 illustrates such a case.

As work on the Independent System proceeded, the contractors began to submit alternate designs calling for steel towers instead of timber towers, indicating that steel was competing on a cost basis with timber for this purpose. Steel-frame construction is now standard for all towers on overhead gas bypassing. Fig. 1 illustrates a 12-in. overhead bypass spanning the subway cut and two side roadways on Queens Boulevard in the Borough of Queens. The location was ideal for a design of this type.

In special cases where pipes are being supported on trestles longitudinally over the subway cut, cable suspension is used at transverse street crossings if the span requires such support. In these cases the cables are anchored directly to the pipe by means of collars attached thereto. The criterion employed in determing whether or not cable suspension is to be used is an allowable maximum deflection of 3 in. of the pipe in the center of the span; if the deflection with snow and ice load is greater than 3 in., cable suspension is usually used.

Trestle Support—When overhead bypass pipes are carried along the line of the subway, they are usually supported on timber or steel bents located on the sidewalk, either on the decking if the excavation extends under the sidewalk or on the undisturbed walk if the excavation is entirely within the street.

When plans and specifications were being prepared for that part of the city-owned Independent Subway System along 8th Ave. from 14th to 59th Sts., it was originally decided to support the longitudinal overhead gas bypass along that avenue on trestles resting on the subway decking over the sidewalk. Business interests along the avenue protested that this method of caring for the longitudinal gas bypasses would seriously interfere with the conduct of their business. Further studies were made, and it was finally decided to place the bypasses, which were up to 24 in. in diameter, in the gutter protected by timber railings between transverse streets and provided with pedestrian ramps at intersections.

While all temporary gas-bypassing forms a part obstruction on the street, an effort is always made to minimize this and make it as unobjectionable as possible. It is for this reason that the practice has been adopted of omitting trestle support where possible. Up to 24-in. diameter inclusive, the pipes are generally carried on the ground. Gas-tight boxes are provided around the pipes, and where pedestrians cross over them slotted walks are provided.

All longitudinal pipes above 24 in. in diameter are carried overhead on trestles. Originally the practice in spacing trestle bents was very conservative, the distance from center to center of bents being 20 ft. for all sizes of pipes, except at street intersections. This caused a serious obstruction on sidewalks, to reduce which more advantage is being taken of the strength of the pipes, which can safely span much greater distances between bents. The procedure now is as follows: (1) in no case is the spacing made less than 20 ft.; and (2) in general, the spacing, or distance from center to center of support, is made no greater than one-half of the computed span necessary to produce a maximum unit stress of 20,000 lb. per sq.in. in the pipe or pipes being simply supported, assuming full snow and wind loads acting.

This practice provides for the possibility of one bent either settling or collapsing, in which case the pipe or pipes will be supported by the two bents ad-

jacent to the one out of service without developing unsafe stresses. The deflections under such stresses might be excessive, but the condition would be temporary only pending repairs to the affected bent.

The reasons for adopting these practices is the fact that inasmuch as the trestle bents frequently rest directly on the decking, the possibility of settlement or collapse is always present with consequent danger of causing high bending moments in the pipes being supported and where trestle bents do not rest directly on the decking, they are usually so close to the sheeting line that danger of settlement on account of possible earth slippage is not entirely removed.

It is planned to use steel bents exclusively in the future, since fewer bents will be required and greater loads will be imposed on each bent. Steel bents and towers also shut off less light than those constructed of timber. Other advantages are that they are fireproof and present a better appearance. Fig. 5 illustrates the past practice in trestle construction.

Bridge Support—Bridge support for overhead bypasses is usually adopted when it is impossible to secure a firm foundation for cable suspension towers and anchors. The use of through-truss bridges makes possible the placing of the supporting towers directly on the decking and minimizes the danger to the overhead bypass structure from settlement of the decking. Any settlement of the decking can readily be taken up by jacking or underpinning.

Sometimes it is necessary to carry gas bypasses overhead in the middle of a block. In such cases truss bridges are used to advantage because of the limited space available for cable suspension towers and anchorages.

In designing through-truss bridges to support gas pipes, consideration should be given to the deflection of the structure under full load. Some camber should be provided, so that any sag which may occur will leave the structure horizontal. For the same span a truss bridge is more expensive than cable suspension, and therefore the former should only be used where it is absolutely necessary.

Joints and Couplings—The type of joint most widely used at present on gas bypasses is the coupling of the Dresser type. Screwed couplings have been used extensively in the past, generally on the sizes from 4 to 12 in. McCluskey fittings are specified on all gas bypasses at points where they enter the ground. Welded joints are also used frequently for this, particularly when making bends and turns around corners.

Cost of bypassing

Table I shows the variation in costs of gas bypassing on different parts of the city-owned Independent Subway System built to date; the 6th Ave. branch is not included. The total cost of the temporary bypassing of gas pipes on the whole system, exclusive of the 6th Ave. branch, was about $6,000,000, which is about 1.9 per cent of the total construction cost of the subway structure proper, exclusive of track, power, equipment, etc. The average cost of gas bypassing per mile of subway was about $127,000.

High gas-bypassing costs are encountered in the more highly developed sections of the city, where the mains are large and numerous. On 8th Ave. between 28th and 47th Sts., roughly a mile in distance, the cost was about $400,000. In interpreting the cost figures shown in the table comparison should be made with the *Engineering News-Record* index of cost of construction. This will enable an estimate of present-day costs to be obtained.

Design factors used

In the design of overhead gas bypasses supported by cable suspension, the following factors must be considered: (a) dead weight of pipe, cables, accessories and towers; (b) snow and ice adhering to all parts of the structure; and (c) wind forces acting on all parts of the structure.

The weights of the various sizes of pipes are given in Table II. These weights include the weights of the joints. The weights of the various sizes of cables, their working loads, breaking loads, etc., were taken from "American Wire Rope, Catalog and Handbook," American Steel and Wire Co. (1913, p. 131).

The snow and ice load is taken as 10 lb. per sq.ft. of horizontal projection of the pipe. This figure is based on the possibility of ½ in. of ice adhering to the pipe circumference and about 2 lb. of snow per square foot of horizontal projection of the pipe. The weight of ice is taken as 57.5 lb. per cu.ft. and the weight of snow as 12 lb. per cu.ft.

In the calculations for wind pressure, a sustained pressure of 20 lb. per sq.ft. is assumed on flat surfaces. This pressure results from a wind velocity of 63 miles per hour, according to Smeaton's rule. The effect of wind pressure on cylindrical surfaces is taken as about 0.6 of that on flat surfaces. This follows conservative practice.

TABLE I—COST OF GAS BYPASSING
(City Independent Subway System, Tunnels Excluded.)

Contract		Subway		Gas Bypassing							
					Sizes		Pipe Ratio—Sub.				
Route	Section	Length in Miles	Cost in Millions of Dollars	Length of Pipe in Miles	Max. In.	Min. In.	Length	Cost Per Cent	Cost in Millions of Dollars For Gas Bypassing	Cost Per Mile of Subway in Millions of Dollars	Cost of Subway Per Mile in Millions of Dollars
78	1–7	6.54	54.22	15.90	48	4	2.43	2.46	1.334	0.204	8.3
101	3–5	1.81	21.90	3.94	30	6	2.18	1.79	0.391	0.216	12.1
102	1–6	2.84	38.67	9.78	36	6	3.43	2.59	1.000	0.352	13.6
103	1–3	2.66	16.07	4.54	30	6	1.71	2.05	0.330	0.124	6.0
104	1–2	1.10	9.65	1.30	28	4	1.18	0.66	0.064	0.058	8.8
105	1–3	1.25	8.24	2.90	30	6	2.32	3.33	0.274	0.219	6.6
106	2–7	4.85	29.34	4.27	36	2	0.88	0.56	0.165	0.034	6.0
107	5–13	6.59	37.02	15.10	36	3	2.30	2.29	0.850	0.129	5.6
108	1–11	10.73	48.56	14.51	20	2	1.35	1.12	0.543	0.051	4.5
109	1–7	5.72	29.92	7.20	42	3	1.26	0.99	0.295	0.052	5.2
110	1–5	3.68	23.38	9.68	24	6	2.63	3.46	0.810	0.220	6.3
All Routes		47.77	316.97	89.12	48	2	1.85	1.90	6.056	0.127	6.62

The above subway costs are in round figures and do not include station finish, track installation, power and ventilation equipment or pumping equipment.

TABLE II—WEIGHTS AND OTHER DESIGN FACTORS EMPLOYED FOR OVERHEAD GAS-MAIN BYPASSING

Nominal Diameter, In.	Weight Per Foot Lb.	Outside Diameter, In.	Thickness, In.	Weight of Accessories Lb. Per Ft.	Weight of Snow and Ice Lb. Per Ft.	Total Vert. Load Lb. Per Ft.	Wind Load Lb. Per Ft.	Resultant of Vert. & Wind Load Lb. Per Ft.	Tangent of Angle Between Vertical and Resultant	Moment of Inertia Pipe Section, In.⁴	Section Modulus Pipe Section, In.³	Span Producing Maximum Stress of 20,000 Lb. Per Sq.In., Ft.	Maximum Deflection in Center of Span with Max. Stress of 20,000 Lb. Per Sq.In., In.	Span Producing Maximum Deflection in Center of Span of 3 In., Ft.
4	10.89	4.500	0.237	1.1	3.8	15.8	4.5	16.4	0.285	7.23	3.21	51.0	11.62	36.5
6	19.19	6.625	0.280	2.0	5.5	26.7	6.7	27.5	0.251	28.14	8.50	64.2	12.43	45.0
8	25.00	8.625	0.277	2.5	7.2	34.7	8.6	35.8	0.248	63.35	14.69	73.9	12.68	51.6
10	32.00	10.750	0.279	3.2	9.0	44.2	10.7	45.6	0.242	125.90	23.42	82.8	12.75	57.7
12	45.00	12.750	0.330	4.5	10.6	60.1	12.7	61.4	0.212	248.50	38.97	91.9	13.28	63.4
14	45.68	14.000	0.312	4.6	11.7	62.0	14.0	63.6	0.226	314.90	44.98	97.0	13.48	66.7
16	52.36	16.000	0.312	5.2	13.4	71.0	16.0	72.8	0.225	474.00	59.25	104.1	13.52	71.4
18	59.03	18.000	0.312	5.9	15.0	79.9	18.0	81.9	0.225	679.30	75.47	110.8	13.68	75.9
20	65.71	20.000	0.312	6.6	16.7	89.0	20.0	91.2	0.225	936.70	93.67	116.9	13.67	80.0
24	94.62	24.000	0.375	9.4	20.0	124.0	24.0	126.3	0.194	1,942.00	161.80	130.5	14.23	88.5
30	138.13	30.000	0.437	13.8	25.0	176.9	30.0	179.4	0.170	4,440.00	296.00	148.2	14.65	99.7
36	148.40	36.624	0.312	14.8	30.5	193.7	36.7	197.1	0.189	5,870.00	321.00	147.3	11.85	104.5
48	197.60	48.624	0.312	19.8	40.5	257.9	48.7	262.5	0.189	13,815.00	568.00	170.0	11.86	120.5

In the design of the steel towers the following stresses are used, these being about the same as the stresses permitted in subway and elevated railway design: (1) compression (columns) 20,000-110 l/r lb. per sq. in.; (2) bending (beams, outer fiber) 20,000 lb. per sq.in.; (3) combined bending at compression not to exceed 20,000 lb. per sq.in.; (4) value of l/r (main members) not to exceed 100; and (5) value of l/r (secondary members) not to exceed 150.

The practice described was developed under the supervision of the Board of Transportation, of which John H. Delaney is chairman and Robert Ridgway was (until his recent retirement) chief engineer; Jesse B. Snow has succeeded in that position. The plans for the Independent Subway System were prepared under the direction of A. L. Raisman, chief designing engineer; S. D. Bleich was assistant division engineer in charge of the design of gas-main bypassing work, and the writer was under his supervision.

Review of Street and Paving Progress in Chicago

Concrete and asphalt now the principal paving materials — Street widenings have been costly — Grade separation for high-speed traffic becoming necessary

THE GREAT VARIETY of paving materials during a 50-year period at Chicago, together with important and expensive works of street widening and grade separation, were reviewed at the annual meeting of the Illinois Society of Engineers in two paper by H. J. Fixmer and J. A. Moore, assistant engineers in the city's Board of Local Improvements. The former dealt especially with the paving, while the latter was concerned more with the larger improvement projects, but the two papers were complementary and are both included in the following abstract.

Types of street paving

From 1890 to 1910 there was a great increase in paving of various types, and the advent of the self-propelled vehicle about 1910 ushered in a new era of pavement design and demand for the extension of paved areas. Cedar block and waterbound macadam were abandoned. Asphalt on a macadam base, and later on concrete, became the leading pavement, particularly on boulevards and residence streets. Brick and bituminous macadam were widely used. Granite blocks were used on slopes at bridge approaches, on streets with heavy trucking, and around freight stations. Creosoted wood blocks were used experimentally as far back as 1905, but not extensively (except in alleys) until 1925. The 50-year progress in paving at Chicago, with the annual mileage laid with different materials, is shown by the accompanying chart and table. Concrete, asphalt and minor use of granite block are the prevailing types at present. Asphalt-macadam is used on a few light-traffic streets, and brick occasionally for patching worn places in other paving.

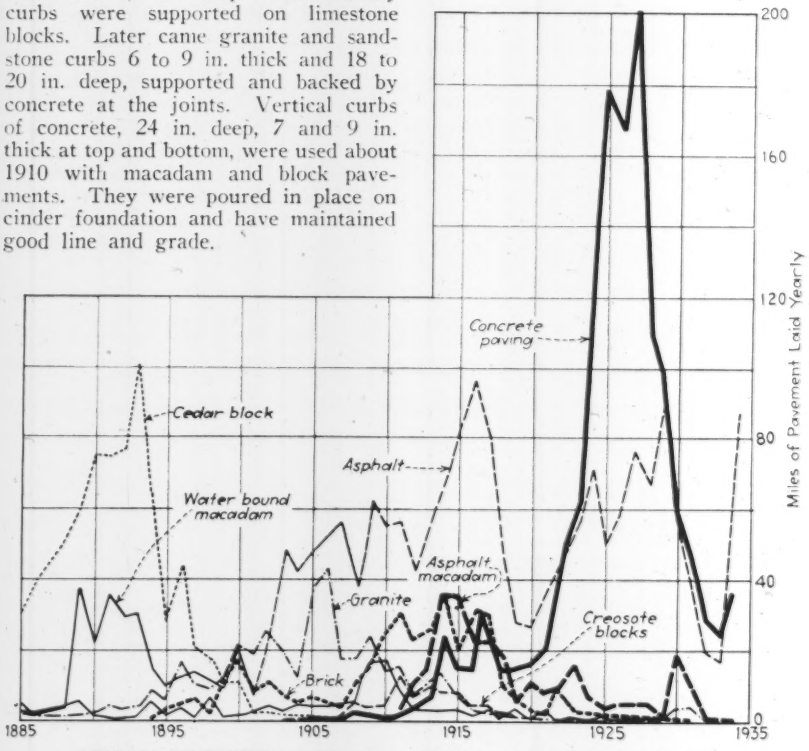
Curb and Gutter — Curbs were required on early work to prevent the pavement from spreading and to confine vehicle traffic to the roadway. Limestone slabs 5 in. thick, 2 to 3 ft. deep and in lengths of 5 to 6 ft., were first used; then sandstone 5 to 6 in. thick and 30 in. deep These heavy curbs were supported on limestone blocks. Later came granite and sandstone curbs 6 to 9 in. thick and 18 to 20 in. deep, supported and backed by concrete at the joints. Vertical curbs of concrete, 24 in. deep, 7 and 9 in. thick at top and bottom, were used about 1910 with macadam and block pavements. They were poured in place on cinder foundation and have maintained good line and grade.

Early gutters were of cobblestone or brick. Portland cement in paving work made its first appearance in the combined curb and gutter, usually with a curb 5 to 7 in. thick and a 5-in. gutter apron 18 in. wide. The exposed surfaces were finished with a 1:2 mortar of cement and granite screenings. In present practice, the curb is 7 in. thick, and the 12-in. gutter apron is the full depth of the pavement, made of the same concrete as the base or pavement, to which it is anchored with ½-in. bars.

Alleys and Sidewalks—Brick was the leading pavement for alleys until about 1918. Concrete superseded it and is now the only type used. The alleys are formed concave, with a lateral slope of 1 in 60, and they are provided with a gutter along the center line. The longitudinal grade is about 6 in. per 100 ft. This paving is generally 7 in. thick, with concrete testing 2,500 to 3,000 lb. in compression.

In addition to the ancient plank and cinder sidewalks, stone slabs were popular 50 years ago. Concrete came into use in the 90's and is now universal. Sidewalks are usually 5 in. thick, 6 ft. wide and marked into slabs 5 ft. long. They are poured in two courses, the top being a 1:2 mortar ¾ in. thick. One-course walks, made with 3,500-lb. concrete, are also used. Vault sidewalks are either of reinforced concrete or concrete arches on structural steel beams.

Driveways are built across the sidewalk space for access to buildings,



MILEAGE OF PAVING of different types laid annually in Chicago, 1885-1935.

principally garages. It is aimed to limit their grade to 4 per cent, and although this requires some alteration of existing floor levels and adjustment of adjacent sidewalks, it is found well worth while in view of the importance of pedestrian traffic. These driveways are of the same material and finish as the sidewalks, but are 7 to 9 in. thick.

Crown and Contour—Introduction of rigid concrete paving or base permitted a reduction of the former high crown of the street, and much study has been given to the development of a surface with a high degree of smoothness and evenness of contour. As a result there have been adopted such improvements as vertical curves, large corner radii, reduced crown across intersections of minor streets, and cross-walk steps of height not exceeding 9 in. The old type of false gutter has been replaced by the summit cross-walk in residence districts or across streets of minor traffic. On arterial streets the gutter is 3 to 9 in. below the top of curb. The gutter grade on both streets and alleys ranges from 0.3 to 0.5 ft. per 100 ft.

Beginning with 12th St. (Roosevelt Road) in 1911, a street-widening program has been undertaken. Property was secured by condemnation, and the cost, including paving, was paid by special assessment and special bond issues. This subject, enlarged upon by Mr. Moore, brought out the fact that most of the present downtown district was originally residential property, with streets either 60 or 80 ft. wide. Street widenings have been undertaken for three principal reasons: (1) needs of a growing local business district, (2) need for broader streets to serve traffic to and from a main business center, and (3) necessity for broad continuous routes through the city.

Due to lack of continuity of streets in adjacent subdivisions, section-line business streets have usually been selected for widening, as they are generally continuous and fairly uniform as to width. But more careful study would frequently have shown that such streets were the more costly and less desirable to widen. Buildings on such streets are more expensive and are usually built fronting on the street line. Buildings on residential streets are usually set back far enough to permit of street widening without moving, cutting off or destroying them. The attempt to provide through-traffic routes or speedways out of business streets has many disadvantages such as curtailed parking facilities and increased crossing dangers, which frequently more than offset benefits. On such thoroughfares, traffic control by lights and signals is necessary, with resultant hampering of speed.

The first example of grade separation in Chicago was the construction of street viaducts over railways at street crossings and at bridge approaches along the river. But 1900-1910 was an era of extensive track elevation by the railroads, usually accompanied by depression of the streets at the subways. The expense, including the street work, was then paid entirely by the railroads. With the development of automobile traffic the railroads' revenues have been so reduced as to preclude such great expenditures.

PAVING MATERIALS IN CHICAGO

	Period Used		Miles Laid 1885–1935
	From	To	
Waterbound macadam	1857	1918	531
Wood blocks (rectangular)	1860	1880	.....
Granite block	1870	1931	147
Cedar block (round)	1877	1903	.....
Asphalt block	1877	1887	.....
Medina stone block	1878	1885	.....
Asphalt	1882	1936	1,877
Brick	1890	1924	384
Creosoted-wood block	1904	1921	74
Concrete	1905	1936	1,342
Bituminous macadam	1911	1931	249
Miscellaneous	1885	1933	12

In recent years, with the construction of through-traffic arteries, numerous highway grade-separation works have been built. But the problem of providing means for fast vehicular traffic to and from the heart of the city, without interference from cross-traffic, remains to be solved. Engineers have been endeavoring to devise some means of continuous grade-separation by elevated or depressed highways for high-speed traffic. In 1933, a report by Miller McClintock, of Harvard University, recommended a system of elevated highways. Another project was for an elevated highway alongside the elevated line of the Chicago & Northwestern Ry. from the west city limits to the river. Mr. Moore concludes with the statement "It is evident that some means of providing funds for the construction of these very necessary public improvements must be adopted."

Caustic Embrittlement of Steel Accelerated by Silicates

NEW LIGHT is thrown on caustic embrittlement of steel at elevated temperatures, as in steam boilers, by experimental results reported by W. C. Schroeder and A. A. Berk, of the U. S. Bureau of Mines Experiment Station at New Brunswick, N. J., before the American Institute of Mining and Metallurgical Engineers *(Technical Publication 691)*.

Previous experience and investigation had established that caustic soda in boiler water or elsewhere in contact with steel at elevated temperatures produces serious embrittlement of the metal (*ENR*, July 22, 1926, p. 151). In the New Brunswick research, however, it was found that sodium hydroxide alone produces either no embrittlement or a slow weakening of moderate amount. Commercial sodium hydroxide such as had been used in earlier investigations was found to contain substantial amounts of other salts (sodium carbonate, sodium chloride, sodium silicate and various metallic oxides). Separate study of the influence of each of these contaminating ingredients, when combined with chemically pure sodium hydroxide, showed that none of them had noticeable embrittling influence except the sodium silicate.

The tests were made on flange steel having at normal temperature a tensile strength of 58,000, a yield point of 28,000, and an elongation of 40 per cent, and corresponding properties at 250 deg. C. of 69,000, 21,000 and 33 per cent. In the form of a carefully made tubular specimen, specially designed for the embrittlement test, the material had a tensile strength of 82,000 to 83,000 lb. per sq.in. When this tube was filled with water or with sodium hydroxide solution (25 g. per 100 g. water) at 250 deg. C., a load of 75,000 lb. per sq.in. maintained for 43 days did not produce failure. When commercial caustic soda was used, however, failure occurred in less than a day at a load of 70,000 lb. per sq.in., and in two or three days at a load of 55,000 lb. per sq.in. A corresponding effect was produced by chemically pure sodium hydroxide with 0.15 to 3.0 per cent additions of sodium silicate to the caustic soda solution.

Microscopic examination of a broken specimen showed that "One of the chief characteristics of the action of the silicate-hydroxide solution is the production of a large number of almost completely intercrystalline cracks in the steel." Stress concentration intensified the weakening effect of the silicate-hydroxide solution. A tubular specimen with an eccentric groove turned in its outer surface to produce unequal distribution of the tensile stress had a short-time strength of 70,000 to 73,000 lb. per sq.in. (average load), but failed at lower stress when subjected to the action of chemically pure caustic soda (failure in 4 to 80 days under average loads from 68,000 down to 55,000 lb. per sq.in.; no failure in ten days at average loads of 45,000 and 50,000 lb. per sq.in.).

In cases where the active solution was a mixture of silicate and hydroxide, however, fairly rapid failure resulted even at average loads as low as 20,000 lb. per sq.in. (failure in 75 hours with 0.16 to 0.32 per cent silicate content added to 25 per cent sodium hydroxide content).

The study was made in cooperation with the Joint Research Committee on Boiler Feed Water Studies.

Design of Reinforcement in Circular Concrete Siphons

An outline of considerations and controlling factors in stress analysis to insure proper arrangment of steel reinforcing

By D. B. Gumensky
Assistant Engineer, Metropolitan Water District, Los Angeles, Calif.

REINFORCED-CONCRETE siphons are an important structural feature of the Colorado River Aqueduct, and their construction presents many interesting problems of design. General principles of design in regard to the economic selection of the type and the size of siphons and the influence of terrain and other conditions were described in *Engineering News-Record* of June 27, 1935, p. 899. The present article deals with the specific feature of steel reinforcement in circular siphons, of which there is on the aqueduct an aggregate length of 24.36 miles with diameters varying from 11 ft. 5 in. to 16 ft.

Sufficient amounts and a proper arrangement of steel reinforcement within the concrete shell of the pipe insure the safety and the correct functioning of the structure. In order to design the pipe and its reinforcement, one should know the loads that the pipe will have to withstand and the distribution of stresses within its shell. Consideration must be given to the strength, watertightness and economy.

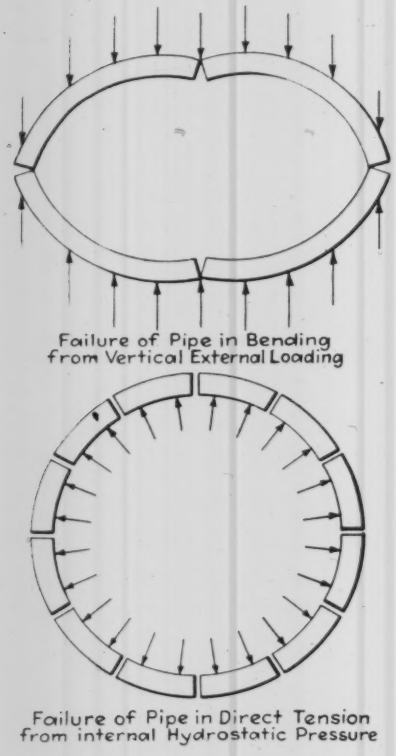

Failure of Pipe in Bending from Vertical External Loading
Failure of Pipe in Direct Tension from Internal Hydrostatic Pressure

FIG. 1—PIPES FAIL from two principal causes, Bending due to external loading or tension due to hydrostatic pressure.

Loads on pipe

All forces acting on pipe can be resolved into those acting along the axis of pipe producing longitudinal stress of compression, tension or bending and those acting at right angles to the axis of pipe, producing either direct or bending stress in the pipe shell around its circumference.

Longitudinal forces are incidental in the design of pipe and may be produced by an uneven settlement of the ground, by a change in volume of concrete produced by shrinkage and temperature changes, or by an unbalanced longitudinal component of weight or water pressure. These forces are taken care of by the longitudinal reinforcement in monolithic type of construction, or in precast pipe by construction of joints which allow movement of pipe sections without leakage, and by construction of sufficiently heavy anchors.

In a plane transverse to the axis of pipe there are forces tending to burst the pipe, produced by the internal hydrostatic pressure, and forces tending to collapse the pipe inward produced by the weight of the pipe shell, weight of the water, pressures caused by the backfill and pressures caused by the moving loads. In Fig. 1 are shown two typical cases of pipe failure, illustrating the action of these forces. On examination of this illustration it becomes apparent that in order to reinforce against hydrostatic pressure alone, a circular hoop concentric with the pipe shell, placed preferably near the outside face of the pipe shell, should be used. Reinforcement against collapsing failure in bending should be placed near the inner face of pipe shell at top and bottom and near the outside face at the sides of the pipe. An elliptical hoop with its major axis horizontal placed within the circular concrete shell of the pipe answers these requirements. In actual cases of pressure pipe both the internal pressure causing the direct tension and the external loads causing the bending moments have to be provided for in the design.

In Fig. 3 (left side) are shown two typical loads acting on pipe and the positions of thrust line, which indicate the stress distribution in the shell of the pipe.

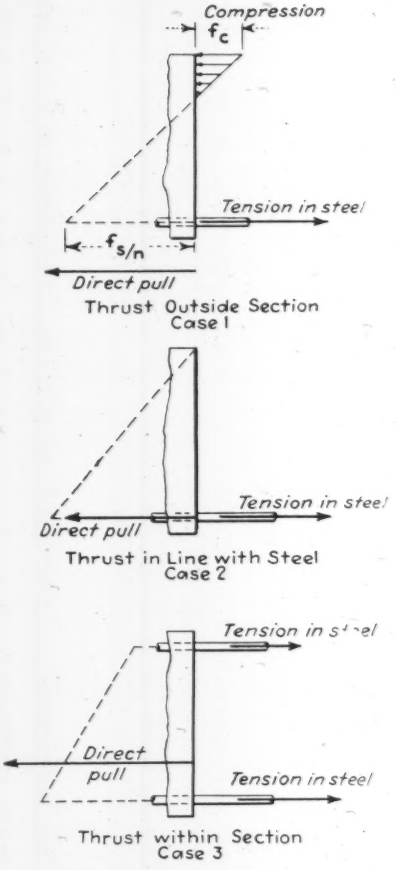


FIG. 2—TYPICAL CASES of combined bending and tension.

In Fig. 3 (right side) are illustrated typical design cases for low head and for high head. For the case of low head the eccentric position of the thrust line, well outside the shell, indicates the predominance of the bending stress, while for the case of high head the direct tension prevails, with the thrust line located within the shell of the pipe.

Combined tension and bending

The position of the thrust line with respect to the axis of the pipe shell determines whether one or two layers of reinforcement should be used. Where the bending moment predominates and the direct tension line is outside the section, part of the concrete in the section is under compression. A single layer of reinforcement is best suited to such a condition of stress, as any reinforcement in the compression face would be so understressed that its use generally would not be warranted. This condition is illustrated as Case I in Fig. 2. With the increase in direct tension, its line of action (thrust line) moves toward the center of the section. The po-

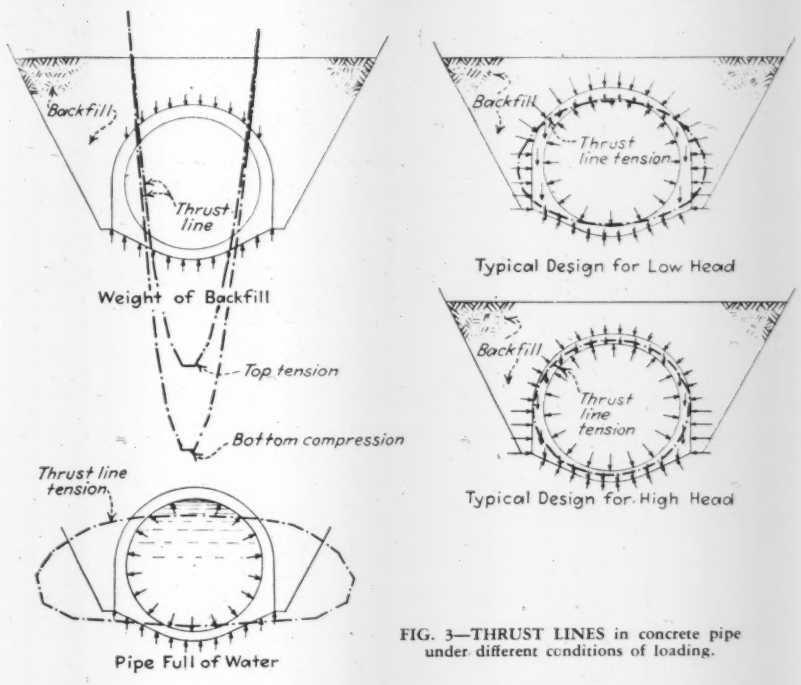


FIG. 3—THRUST LINES in concrete pipe under different conditions of loading.

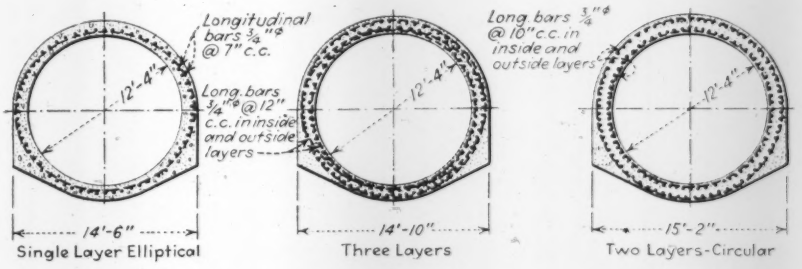


FIG. 4—MONOLITHIC PIPE, showing arrangement of one-, two- and three-layer reinforcing. (All steel is embedded at least 3 in.)

sition, as shown in Case 2 of Fig. 2, where the line of direct tension coincides with the reinforcement steel, is the limit for Case 1 with zero stress in concrete.

As the line of direct tension moves past the reinforcement steel toward the center of the section, as shown in Case 3 of Fig. 2, the second layer of steel near the other face of the concrete shell becomes necessary. Should only one layer of reinforcement be used in this case, the section would be unbalanced, unless concrete carried stress in tension, which could not be counted on with safety.

Where the line of direct tension is within the effective section and two layers of reinforcement are required, the amount of steel in each layer for equal unit stress should be inversely proportional to the ratio of distances from the line of direct tension to the line of reinforcement. For central or nearly central position of the tension line two layers of steel with equal amount in each layer give a well-balanced design. However, when two equal layers are used for a fairly eccentric position of the tension line, the steel is overstressed in the closer layer and understressed in the further one.

Reinforcement in aqueduct siphons

All concrete siphons in the aqueduct, except two located on top of a rocky ridge, are buried in the ground with at least 3 ft. of cover over them. Under drainage channels and washes where there is a danger of deep scour the depth of cover is greater, reaching in places 10 ft.

The reinforcement in the siphons was designed to resist the direct tension produced by the hydrostatic pressure and the bending moment produced by the weight of the backfill combined with the weight of the pipe shell and the weight of the water in the pipe.

For the prevailing low and moderate heads, the transverse reinforcement consists of a single layer of elliptical hoops with major axis in a horizontal plane. For higher heads, the reinforcement consists of three layers of steel: circular hoops near the inside face of the pipe shell, circular hoops near the outside face of the shell, and the elliptical hoops which fit in between the inside circular bars at top and bottom of the pipe and between the outside circular bars at the sides of the pipe. The use of elliptical hoops with a double layer of circular hoops is a departure from the precedent of using only two circular hoops. However, the use of elliptical hoops is believed to result in a well-balanced economical design, as they help to concentrate the metal where it is needed the most. In Fig. 4 are shown the typical elliptical and three-layer reinforcements in the aqueduct siphons. The two circular layers were used in the exposed Eagle Lift siphon where maximum head reaches 153 ft., and the absence of backfill makes the direct tension a predominant stress.

Unit stress in steel

In case of hoop tension the concrete cannot be counted on to contribute to the strength of the pipe, and these stresses are resisted entirely by the steel. Under tension, the hoop steel stretches by an amount proportional to the unit stress, and the concrete cracks minutely along the bars. If the stress in steel is high, these cracks may open up sufficiently to allow the water to seep through them. Unit stress in steel should be low enough to prevent this condition.

If the unit stress in steel were kept the same for all pressures, the size and the distribution of these cracks would be about the same for all pressures. However, we know that the penetrating power of water increases with the pressure, and therefore the design based on a uniform unit stress for all heads, although safe and watertight for a 30-ft. head, may result in a leaky pipe for a head of, say, 100 ft. On the other hand, if the unit stress is so low that there is no seepage under a head of 150 ft., then the design of pipe for a 30-ft. head using the same unit stress would result in an excessive amount of steel and would be uneconomical. These considerations suggest the use of lower unit stresses as the internal pressure increases.

For some cases of combined direct tension and bending (cases of low and moderate heads), the concrete helps to resist bending and is under compression. It may be said that under such condition, the steel could be stressed up to 16,000 or 18,000 lb. per sq.in., and still the concrete shell would be watertight. The points of counterflexure, of course, would be under direct stress only and would have to be designed for steel of low unit stress; however, at such points the total stress in steel is much lower than at the point of combined tension and bending. The above reasoning suggests the method of design in which, for cases of combined tension and bending, the unit stress in steel could be kept relatively high, at the same time limiting the minimum amount of steel by the requirement of watertightness under direct hydrostatic pressure. In case

FIG. 5—THREE-CAGE REINFORCEMENT in use on the Colorado River Aqueduct. The middle form is in place, weighted down and ready for concrete.

of precast pipe the above considerations were given full weight. However, in the design of the monolithic pipe, because of the imperfect control of the quality of the concrete, and because of precedent the same unit stresses were used for the combined bending and tension as for the direct tension.

In precast pipe where steel cylinder membrane is used, the consideration of leakage is absent and the unit stress of 13,500 lb. per sq. in. is used for direct tension. This value is one-half the value of the elastic limit for the plate used.

Longitudinal reinforcement

The longitudinal reinforcement steel in monolithic pipe takes the tension stresses produced by the temperature changes, by the shrinkage of concrete or by the uneven settlement of the ground. Its amount is one-quarter of 1 per cent of the total concrete area for buried pipe, and one-half of 1 per cent for exposed pipe. In precast pipe the amount of longitudinal steel is nominal, necessary for tying the reinforcement cages together.

All engineering and construction work of The Metropolitan Water District of Southern California is under the general direction of F. E. Weymouth, general manager and chief engineer; J. L. Burkholder, assistant general manager; and Julian Hinds, assistant chief engineer. W. C. Christopher, designing engineer, is in direct charge of design.

Continuous Truss Design by Moment Distribution

Use of column analogy to determine stiffness and carry-over factors of truss spans permits including effects of web deformations

By Truman P. Young
Structural Engineer, Cincinnati, Ohio

MANY DESIGNERS are familiar with the methods of moment distribution developed by Prof. Hardy Cross. By this means, continuous girders with any number of spans and with variable moments of inertia within each span are easily handled, once the elastic constants (stiffness and carry-over factors) and the fixed-end moments due to the applied loads have been determined.

Multi-span trusses may likewise be designed as continuous girders with varying moments of inertia. In one method, which is essentially similar to that known as "elastic weights," the moment of inertia of the truss at any panel point is taken as the product of the area of the chord member whose center of moments is at the same point, multiplied by the square of the moment arm of that member. However, with this method it is difficult to include the effect of the deformations of the web system. This omission usually results in rather small errors on the side of safety, so far as moments over the supports are concerned. But in some cases, notably trusses with curved chords or unusual depth ratios, omission of the web deformations may lead to considerable errors and may give moments over the supports much less than actual. It is consequently often desirable to take account of the web system, if only to discover whether its omission is justifiable.

Where absolute rather than relative deflections are sought, as for camber or deflection, or the effect of uneven settlement of the supports, omission of the web deformations is rarely justifiable.

By the following method the elastic constants and fixed-end moments of the external loads for any span of a continuous truss may be computed, either including or excluding the web members.

The stiffness and carry-over factors for girders of variable section are readily computed by means of the "column analogy." The analogous column is a short column whose section is the $1/EI$ diagram of the girder in question. Since M/EI is the expression for the elastic curvature of a beam, the "area" of the analogous column is also the total angular deformation of the girder when acted upon by unit moment throughout the span.

For a truss, the quantity—or deflection—corresponding to the area of the analogous column is the summation $\sum \frac{u^2 L}{AE}$, in which u is the stress in any

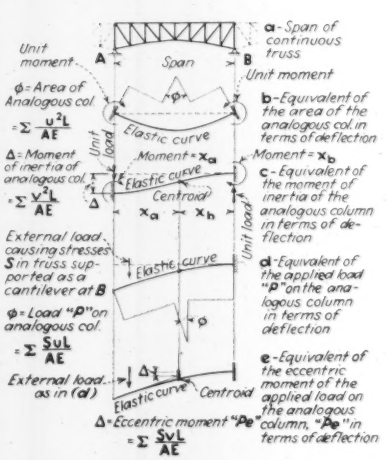


FIG. 1—STEPS in the procedure of determining by the column analogy the stiffness and carry-over factors and the true fixed-end moments of a continuous truss.

member due to unit moment uniformly throughout the span, L is the effective length of any member, and A is its area. (See Fig. 1b.) Such summations are familiar in the method of "least work" or "virtual work."

The moment of inertia I of the analogous column is the summation of the products of each element of its area by the square of its distance from the centroid. This quantity is also the deflection of either end of the member under consideration from the tangent to the elastic curve at the other end, the member being subjected to unit shear throughout its length with zero moment at its centroid. In other words, I is equal to the relative vertical deflection of the ends of the member under unit shear, the ends being restrained against rotation.

For a truss, then, the quantity—or deflection—corresponding to the I of the analogous column is the summation $\sum \frac{v^2L}{AE}$, in which v is the stress in any member due to unit shear throughout the span with zero moment at the centroid (Fig. 1c). The centroid may be located by inspection (at the center for a symmetrical span, or at the support for a span simply supported at one end) except for an unsymmetrical span restrained at both ends, in which case it must be located by means of the equation $\sum \frac{uvL}{AE} = 0$. The procedure is to assume a centroid at any point (preferably near its true location) and compute the values v', the stress in each member for unit shear with zero moment at the assumed centroid. Then the true centroid is at a distance x from the assumed, where

$$x = \frac{\sum \frac{uv'L}{AE}}{\sum \frac{u^2L}{AE}}$$

It follows that $v = v' - ux$, and

$$\sum \frac{v^2L}{AE} = \sum \frac{v'^2L}{AE} - 2x \sum \frac{uv'L}{AE} + x^2 \sum \frac{u^2L}{AE}.$$

The loading P on the analogous column is an imposed angular deformation. It may be an area under an M/EI curve or an assumed rotation, as when the stiffness and carry-over moments are determined for a unit rotation applied at one end of a member. In a truss, the quantity—or deflection—corresponding to P is the summation $\sum \frac{SuL}{AE}$, in which S is the stress in the truss members due to the external load, the truss acting as a statically determinate structure (Fig. 1d).

If the load on the analogous column is eccentric (that is, if the center of gravity of P does not correspond to the centroid), the bending stress on the analogous column will be Pex/I, in which e is the eccentricity of P. In terms of deflection of the girder under consideration, Pe is the algebraic difference between the deflections of its centroid from the tangents to the elastic curve at either end. In a truss, then, the corresponding quantity is the summation $\sum \frac{Sv'L}{AE}$, where S is the same as in the preceding paragraph. It is usually advantageous to assume the truss as acting as a cantilever in computing S, since fewer of the members are stressed. It may, however, be considered as a span simply supported at its ends (Fig. 1e).

To summarize the procedure:

1. Compute for each span the summations corresponding to the area and moment of inertia of the analogous column. (For a span simply supported at one end, the area need not be computed.) From these the stiffness and carry-over factors are immediately derived.

2. Compute for each span the summations corresponding to the load and load times eccentricity, applicable to the analogous column. This must be repeated for each load case desired. When influence lines are required, a unit load must be applied at each panel or to alternate panels. (If the truss is restrained at one end only, the summation $\sum \frac{SuL}{AE}$ need not be made.) From these summations follow the fixed-end moments.

3. Distribute the fixed-end moments, using the elastic constants found under paragraph 1.

4. If influence lines are required, construct first those for the moments over the supports. The others follow from these.

While the labor involved in obtaining the summations just recited may seem at first glance excessive, it is actually but little greater than that necessary to find the corresponding quantities when the trusses are designed without giving consideration to the web deformations. Most of the work can be performed by an inexperienced assistant, the designer merely setting up the tables that are to be computed. In making these tabulations it is usually desirable to group chord and web members, so that subtotals may be struck and the effect of the web members obtained separately.

The writer recently used this method to check the design of a curved-chord continuous truss with three spans of 14, 16 and 14 panels respectively. This experience demonstrated that even for trusses of this magnitude, the effect of web deformations can be included without involving more than two or three man-days of additional time.

An incidental advantage of this method—that is, of working with those deflections which are equivalent to the properties of the analogous column—lies in the ease with which the effects of settlement of a support may be obtained. Consider a support to settle 1 in., without rotation of any restrained joint. Then the change in shear in the adjacent spans is $1/I$, where I is the moment of inertia of the analogous column or the summation corresponding thereto. Since there is no joint rotation assumed, there is no change in moments at the centroids, and the changes in moments at the supports may be written. These moments are of course unbalanced; when the unbalanced portions have been distributed, the true changes in moments, shears and reactions are obtained. Changes for any other value of settlement than 1 in. are of course proportional.

Sewage-Treatment Works for Hartford, Conn.

A SEWAGE-WORKS now under construction for the Metropolitan District of Hartford County, Conn., includes sedimentation and separate sludge-digestion tanks and sludge filters. The area tributary to the plant includes Hartford, West Hartford, Bloomfield and Newington, the north half of Wethersfield and the south half of Windsor. The present population to be served is 200,000 and is expected to be about 300,000 in 1955. About 75 per cent of the existing sewers are of the combined type, but separate sewers are being used on practically all extensions. Units costing about $300,000 have been completed; work in progress will cost about $500,000; design work for the last contract is nearing completion. Trunk sewers of 4- to 6½-ft. in diameter and totaling 8 miles, with a mile of tunnel, 6 ft. in diameter, are included in the project and will probably be completed by 1937.

The units of the plant are: a coarse rack with 4-in. openings; four mechanically-cleaned racks, ¾-in. openings; a shredder of the hammer-mill pulverizer type; four mechanically-cleaned grit chambers, 1-sec.-ft. average velocity and 1-min. detention period, with endless-chain and metal scraper collector and conveyors and inclined screw conveyors to lift the grit from the hoppers; eight 100x68-ft. sedimentation tanks with endless-chain-collector-conveyors; four 100,000-cu.ft. digestion tanks, with provisions for heating and gas collecting; digester and oil-burning boilers; elutriation tanks for digested sludge; two vacuum filters of 350 sq.ft. area.

The plant was designed in the district office, with Metcalf & Eddy, Boston, Mass., as consultants on design and hydraulics. Roscoe N. Clark, for many years city engineer of Hartford, is manager of the Bureau of Public Works of the Metropolitan District Commission. William A. D. Wurts is sanitary engineer in charge of sewage treatment.

Industrial Buildings—II

Walls, Roofs and Floors

It is in walls and window details, in roof form and structure, in floor design and finish that ingenuity and study are forging ahead

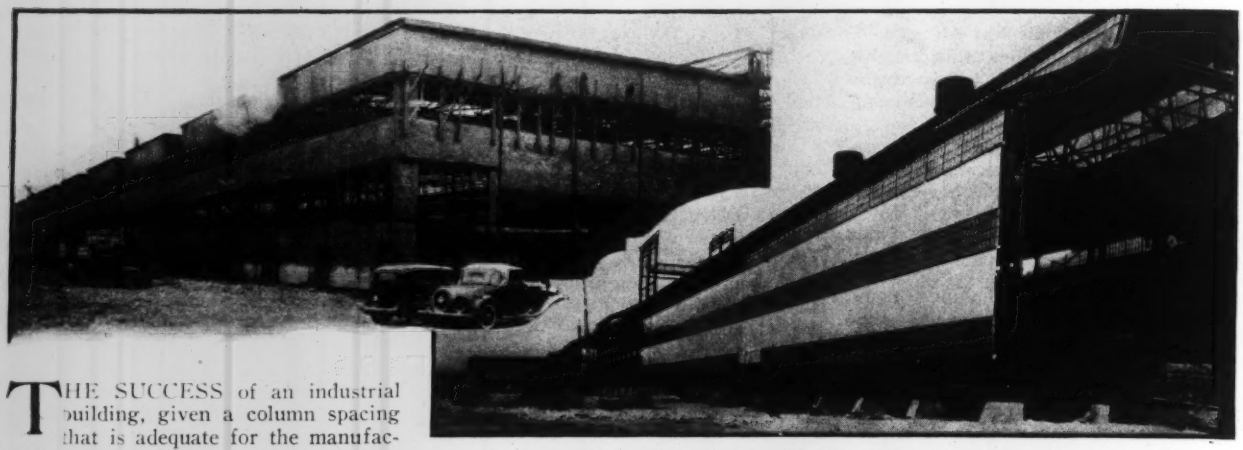


FIG. 1—THE PROSAIC MILL BUILDING exhibits the effects of improvement. More glass and better ventilation characterize the hot-rolled buildings at Bethlehem's Lackawanna plant (right), while the cold-rolled buildings (left) trend toward factory standards with tight brick walls and insulated flat roofs.

THE SUCCESS of an industrial building, given a column spacing that is adequate for the manufacturing process, depends mostly on the efficiency of its skin—walls and roof—to cope with wind and weather. The problem of "enclosing the acreage" with details that exclude weather when required or let it in under control provides a field for continuing study. Add to this the requirements for smooth wear-resistant floors and the industrial building problem is outlined.

Walls and windows

Generalities with respect to wall trends are difficult to phrase with accuracy perhaps because, with respect to the use of windows, to take a dominant wall element, there seem to be opposing trends. At least in the face of a rather general increase in glazed wall areas there are a number of new buildings which foresake windows entirely. As to materials other than steel sash and glazing, brick still predominates. Corrugated metal sheets and air-applied concrete are used extensively in mill buildings. Glass blocks are a new wall material. Rock wool, cork, glass wool, wood fiber boards, and asbestos products find increased application as wall insulation. Asbestos-asphalt-treated corrugated sheets enjoy constantly greater use in industrial building walls; for special installations these protected sheets are also covered with aluminum foil or electro-sheet copper. The Kelsey Hayes Wheel Co.'s new foundry at Detroit utilizes the aluminum-foil-covered sheets for both walls and roof, furnishing a striking appearance for an industrial structure.

One major objective in wall design is a thinner wall with insulating properties equal to the best of present thick walls; George A. Bryant, Jr., vice-president, The Austin Co., thinks that it should not be over 2 in. thick, an ideal, however, on which he does not expect immediate fulfillment. Another objective, more nearly within reach than thin walls, is better expansion joints.

Modern wall practices may best be outlined by referring to some current examples.

Bethlehem—At its huge new sheet mill at Lackawanna, N. Y., the Bethlehem Steel Co. is erecting a dozen mill buildings whose walls mark substantial departures from this company's past practice. More glass is being used than ever before. In the 54-ft.-high walls of the hot mill, for example, there are three continuous lines of wire-glass sash, each 7 ft. deep; the remainder of the wall is an 8½-in. brick base 10 ft. high and two lines of corrugated steel sheeting. A modern touch is the provision of a rail and trolley along the eaves, to support window-washers' cages. Too often such facilities have not been provided in industrial buildings, causing window washing to be neglected; since industrial windows accumulate dirt easily, they need to be washed five or six times a year if they are to be at all useful as light sources. The washing-cage supports also promote safety for the window washers.

The cold-roll buildings, consisting of five 105-ft. bays and varying in length from 575 to 950 ft., are enclosed in solid brick walls 8½ in. thick with a line of 7 ft. steel sash above the crane rail enclosure and a line of 10-ft. steel sash below it. The introduction of cold-finishing facilities at rolling mills has fostered better buildings because of the necessity for eliminating any condensation or dampness that might damage the highly finished sheets. The Bethlehem cold-roll buildings, therefore, are more nearly factory buildings than mills. They are heated by steam-unit heaters, and are equipped with wood-block floors and insulated roofs. Within the building the 105-ft. bay housing the picklers is isolated by a wall consisting of plain steel sheets bolted tight to confine the acid fumes.

The most unusual wall at the Bethlehem plant is used in the new office building. This consists of 4-in. expanded metal studs and columns to the outside of which paper-backed mesh reinforcing is fastened to furnish a mortar anchor to the 4-in. brick facing. The stud spaces are filled with mineral-wool insulation. The interior facing is metal lath and plaster. The total wall thickness is about 9 in.

Ford—The cold-roll building of the Ford Motor Co.'s new steel-sheet mill, like that at Bethlehem, is a factory and not a mill. It goes even farther than the Bethlehem buildings in the use of glazing. Of the 56-ft. height of wall, all but

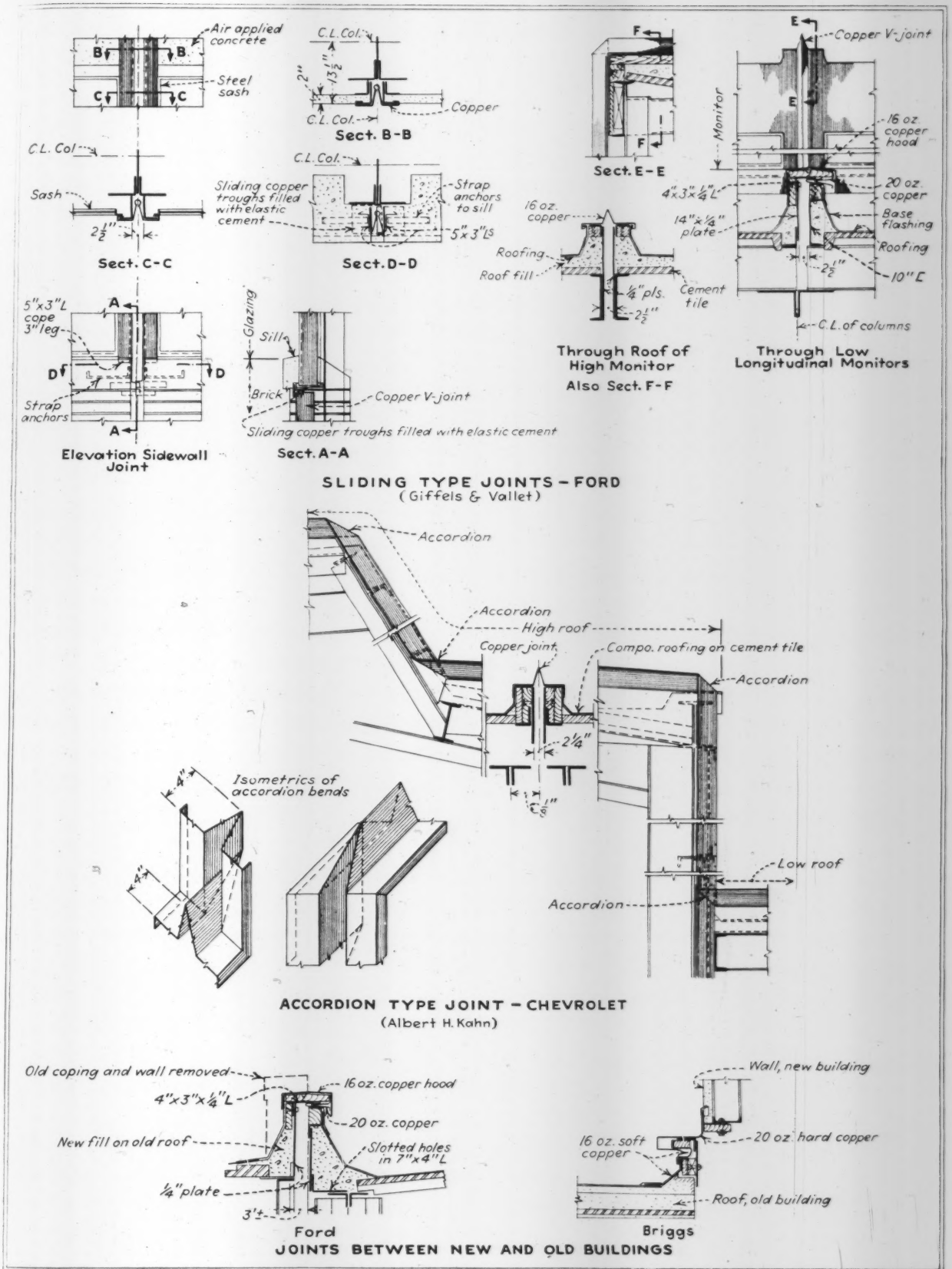


FIG. 2—EXPANSION JOINTS IN WALLS AND ROOFS REFLECT DESIGN INGENUITY.

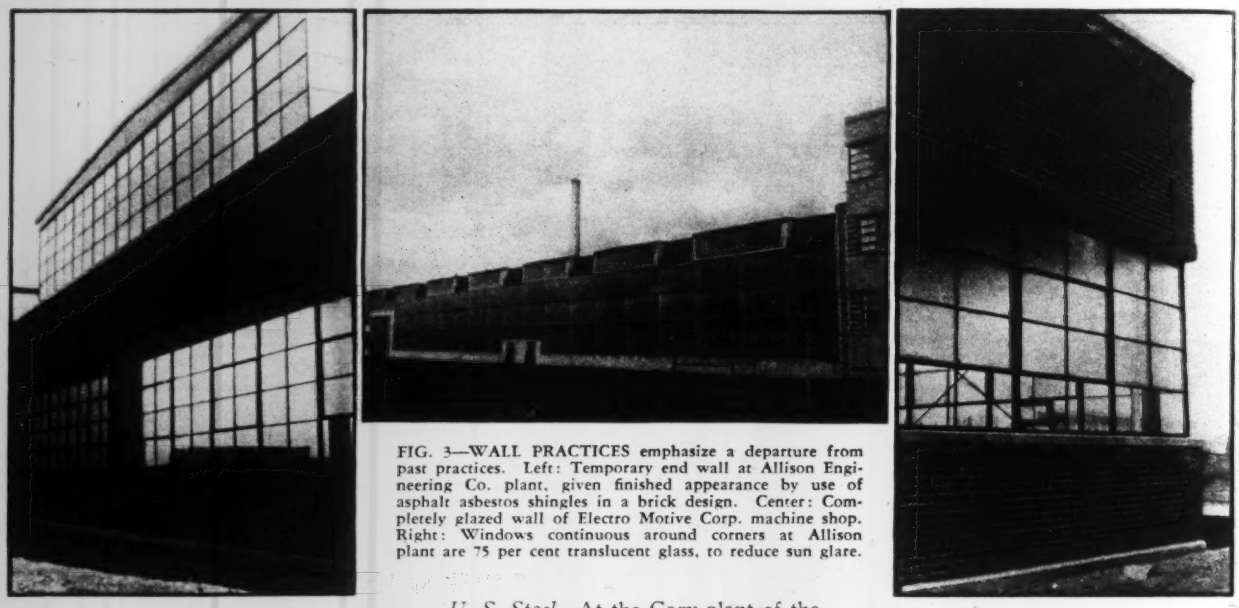


FIG. 3—WALL PRACTICES emphasize a departure from past practices. Left: Temporary end wall at Allison Engineering Co. plant, given finished appearance by use of asphalt asbestos shingles in a brick design. Center: Completely glazed wall of Electro Motive Corp. machine shop. Right: Windows continuous around corners at Allison plant are 75 per cent translucent glass, to reduce sun glare.

about 20 ft. is steel sash and glass in the design made by Giffels & Vallet, Detroit architects. A 12-in. brick-base wall about 3 ft. high is followed by three lines of continuous sash totaling 30 ft., a strip of air-applied concrete 6 ft. wide at the crane rail level, an 8½-ft. line of continuous steel sash, and an air-applied concrete coping 10 ft. deep. The upper line of sash is fixed. All other sash is movable and is motor-operated. A departure from this design is made along one side of the building where a railroad track is located. Here the lower line of continuous sash is replaced by windows in a 12-in. brick wall some 12 ft. high. The air-applied concrete walls used in this building have the advantage of easy construction and light weight. Similar walls are also used in the new motor-car-body shop designed by the same architects for the Briggs Mfg. Co. in Detroit. On both the Ford building and the Briggs building an 8-in.-trolley I-beam is provided along the eaves for window-washing cages, as at the Bethlehem plant.

U. S. Steel—At the Gary plant of the American Sheet & Tin Plate Co. a different wall design is used for the pickling building in the interests of economy and with the belief that the mill-type frame can be satisfactorily adapted to heated factory requirements. The walls thus are made of 20-gage corrugated steel sheets, covered both sides with asphalt, asphalt-impregnated asbestos felt and a waterproof paper envelope; the walls are blank, no windows being used, and the insulating effect provided eliminates interior condensation. The same material is used for the roof. The other buildings at this plant, where insulation is not required, are walled in with bare corrugated metal. No windows are used in any of these buildings, lighting being supplied by roof skylights.

A new type of wall of sandwich construction consisting of two sheets of corrugated metal with ½ in. of wood-fiber board between is used for the motor building. The motor buildings of modern steel mills are air-conditioned (the cool clean air permitting remarkable operating economies for the motors), and a well-insulated building is essential. This sandwich construction, formerly used to some extent for roofs, completely encloses the Gary plant motor building, which is several hundred feet long and some 50 ft. high, the latter to assure good ventilation. The sandwich wall replaces concrete block, which had replaced brick for this type of construction on previous buildings at this plant.

General Motors—Glass sash constitutes most of the wall area of the new Electro-Motive Corp. plant at McCook, Ill. The west elevation, 55 ft. high, contains 50 ft. of sash and 5 ft. of 8½-in. brick wall just above the floor line. Columns are inside the building, so that the expanse of glass is unbroken; glass continuity obtains at the corners also, adding a modernistic note to the appearance of the building. The north and south elevations are similar but contain two 5-ft. lines of 24-gage protected metal, one along the crane rail and one as a coping. The east elevation is broken up by connecting buildings but still presents a considerable expanse of glazing.

At the Allison Engineering Co. plant, a 125x250-ft. single-story factory at Indianapolis, a line of 7-ft. steel sash set 4 ft. above the floor, is continuous around the building, including corners; the only interruptions occur at the doors. The lower pane of the 4-pane sash is clear glass, the others being of ⅛-in. hammered glass, to reduce glare. The walls above and below the windows are 9-in. brick; the top is finished with a brick parapet wall 2 ft. high and a concrete coping. Window sills are metal.

A temporary end wall is used in the Allison building, to permit future expansion. The external appearance of this wall is the same as that of the other walls, but the lower portion is only 4 in. of brick on wood sheathing, while the upper portion is wood sheathing faced with

FIG. 4—CEMENT-TILE ROOFING of light-weight channel sections illustrate industry's preference for prefabrication.

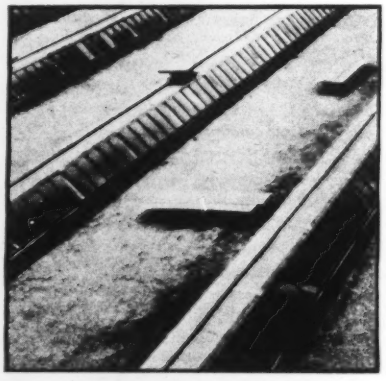


FIG. 5—COMPOSITION ROOFING and gravel on top of a steel deck enclose Continental Can's acreage at Elwood, Ind.

asbestos shingles to simulate brick. Temporary walls always present a difficult problem, and so far as harmony with the permanent part of the structure is concerned the Allison plant wall is strikingly successful.

An innovation at the Allison plant is a dynamometer building where airplane engines will be tested. Elimination of noise being a prime objective, 17-in. brick walls enclose the test rooms. Windows provided for observation purposes contain three panes of plate glass in three different thicknesses—$\frac{1}{4}$, $\frac{3}{8}$ and $\frac{5}{8}$ in.—mounted in steel frames and cushioned against the brick with felt.

Experience in maintaining its branch buildings, particularly during the past five years, has taught the Argonaut Realty Corp., General Motors subsidiary, the value of certain new wall details that have been incorporated in a new parts warehouse at Charlotte, N.C. Since weatherproofing is the main task, 12-in. brick walls are used instead of 9-in. walls, which had proved unsatisfactory. A straight lime mortar has proved best for securing tight joints in the brick work. A colorless waterproofing compound painted on the outside of the wall has also been found beneficial.

Glass composes all of the wall above the brick, which averages about 3 ft. high above the floor. A new practice in installing sash is to remove the mullion covers and fill the space with a mastic calking compound before replacing them; a point formerly vulnerable to moisture entrance has thus been eliminated, since refilling is not necessary.

Parapet walls have proved to be an annoying source of leaks, and their use is being discontinued. When leaks did occur with parapet walls, difficulties arose in fixing the responsibility between the roofing and masonry contractors. Present practice substitutes a coping which is a continuation of the copper roof flashing and is installed by the roofing contractor. This flashing extends down to an intersection with the top of the steel sash.

Special Wall Practices—The new air-conditioned office buildings being built at industrial plants have fostered some new wall practices. The windowless wall is one. This is exemplified at the Hershey Chocolate Corp., Hershey, Pa., where the walls consist of a 20-in. native limestone exterior backed by a 1-in. air space and 4-in. clay-tile plastered. Another windowless wall building has been constructed at the Toledo plant of the Owens-Illinois Glass Co. Here the walls are of glass blocks, some 80,000 of them, each approximately the size of two bricks; the wall thickness is $3\frac{7}{8}$ in. The blocks are manufactured with a sanded enamel or adhesive on the laying edges, to provide bond with the mortar. A third air-conditioned office building is that of the Maytag Washing Machine Co., Newton, Iowa, whose walls, although of conventional stone type, are backed with brick to which are attached $1\frac{1}{2}$-in.-thick cork slabs. Double windows are also used as an insulation aid; the inner windows are of casement type, the outer of double-hung design, to facilitate washing.

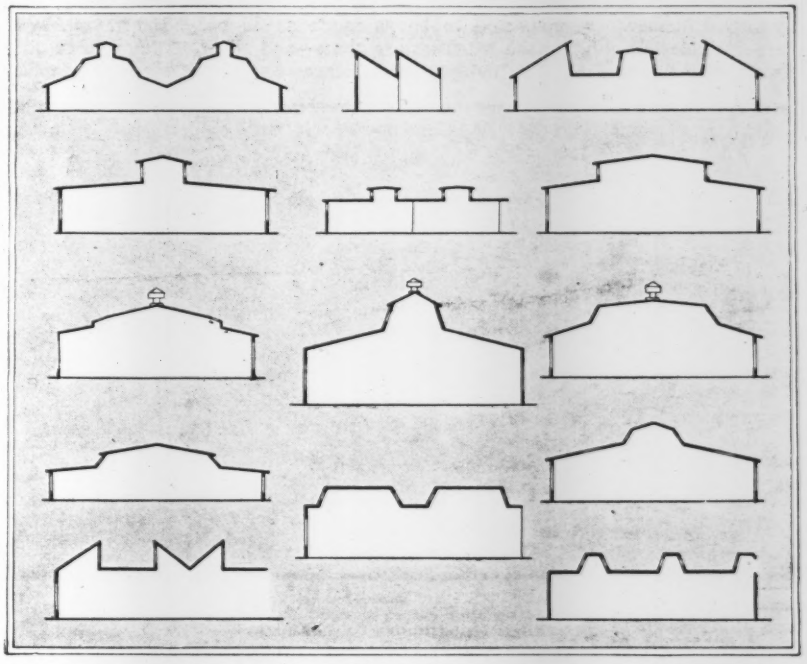


FIG. 6—DIFFERENCES of opinion on roof form still persist, as these typical examples indicate.

Another modern and unusual wall is being used in the new building of the National Can Co. at Baltimore. Conventional brick spandrels are used, but the steel sash is supplemented by glass-block pilasters. These pilasters are 4 ft. 7 in. wide and separate the runs of steel sash, which vary in length from 12 to 17 ft. This arrangement permits entrance of a continuous band of light around each of the four floors, eliminating all shadows and dark spots except those caused by the steel columns.

Wall-Expansion Joints—Varying with the wall material and with the designer, expansion joints are as varied in industrial buildings as they are in bridge floors. Several reported to be satisfactory are illustrated herewith. Although these are put forward as wall-expansion joints, they are often used in the roof also, since a complete separation of the entire building must be effected.

One of the most interesting joints is that developed by John Schurman of Albert Kahn's office in Detroit. It was inspired by the design of an accordion and fundamentally is an accordion pleat which may be made continuous over both walls and the roof.

Expansion in industrial buildings is complicated by many factors, such as the number of open windows and monitors, the direction of the wind, inside temperature conditions, the fact that only the shell is usually subjected to extreme temperature variations, and finally the fact that the design of the framing may often permit light purlins or bracing to bend in themselves and thus take up some movement. Expansion limits therefore are difficult to calculate, but many years' experience with industrial buildings demonstrated to Mr. Schurman that an expansion of $2\frac{1}{4}$ in. in 400 ft. is the maximum to be expected. Accordion joints of copper sheet installed on this basis have proved to be satisfactory.

A special sliding type of expansion joint used on the Ford cold-roll building by Giffels & Vallet and spaced at 250-ft. intervals has also performed well. The joint is designed to permit both perpendicular and parallel movement, as the adjoining and connected building has different expansion characteristics from the cold-roll building. For glass-block walls an open joint about 1 in. wide filled with mastic and spaced at 40-ft. intervals is recommended.

Roofs

On the basis of the functions that it has to perform, the roof of an industrial building is more important than the walls. In addition to providing weather protection, it usually serves as both lungs and eyes of the structure. It is largely through the roof, by way of louvres or windows in monitors or by ventilators, that the industrial building breathes. It is through monitor windows or skylights in the roof that light is admitted, to supplement that which enters through wall windows or to provide the only source of light if

windowless walls are used. Roofs, therefore, offer a fruitful field for design ingenuity, and because of their complex shape, as compared with the plane surface of a wall, provide a relatively difficult design problem. As evidence of the variety of solutions possible, there is the sawtooth roof, the ridge roof with monitor, the ridge roof with skylights, the flat roof with or without skylights, the flat roof with longitudinal monitors, the flat roof with alternate high and low transverse bays, the flat roof with butterfly monitors, and recently the flat roof with both transverse and longitudinal monitors. Combinations of these types of roof with ventilators diversify the list further.

In materials, too, there is wider diversity than in walls. Proprietary materials predominate—and with good reason, for manufacturers of roofing materials and to some extent of all industrial building accessories have built their product and sales methods on a sound research and service basis. The industrial building owner is aided in his desire for rapid construction by these ready-made products; he is proprietary-product-minded because he usually is in a similar business, and he is shop-fabricated-minded because he is a manufacturer; finally he knows (and this applies as well to architects and engineers) that he is buying engineering knowledge of roofing requirements along with the product.

Roof form

Attention to the industrial buildings to be seen from the train when entering any large city will almost convince one that no new forms of roof are possible. Everything seems to have been tried at least once. Yet in Detroit there are two new building roofs—on the Ford cold-roll building and the Briggs body press shop—that are claimed not only to be new in form but new in concept as well. They were developed by Giffels & Vallet, Detroit architects, from theoretical studies of roof requirements made during the lean depression years. They have been patented. Basically, the new element introduced is the relatively simple one of facing monitor windows in all four directions, so as to take better advantage of the vagaries of wind and light. In detail the novelty of the roof lies in the monitor arrangement, which is illustrated in Fig. 7.

The Ford roof, over a building 270x420 ft. in plan, is made up of a 24-ft.-high longitudinal monitor along the building center line, a series of transverse monitors 12 ft. high on either side of it and 12-ft.-high longitudinal monitors along the sides of the building. The side monitors are 19 ft. wide, the central monitor 26 ft. wide. Transverse monitors are 20 ft. wide and 20 ft. apart.

All monitors have glass on all four sides contributing to a minimum of shadow especially in a building such as this where the equipment consists of huge stands of rolls. From the 108,000 sq.ft. of window-sash used, a strong uniform natural light on the working-plane results, said to be as much as 35 cp. when the windows are clean—and all of the most modern conveniences for window washing are provided, including 1½ miles of walkways inside the monitors and an aluminum-alloy ladder and movable platform on either side of the interior of the high central monitor; the outside of the monitor windows can be washed from adjacent roof areas by using long-handled mops.

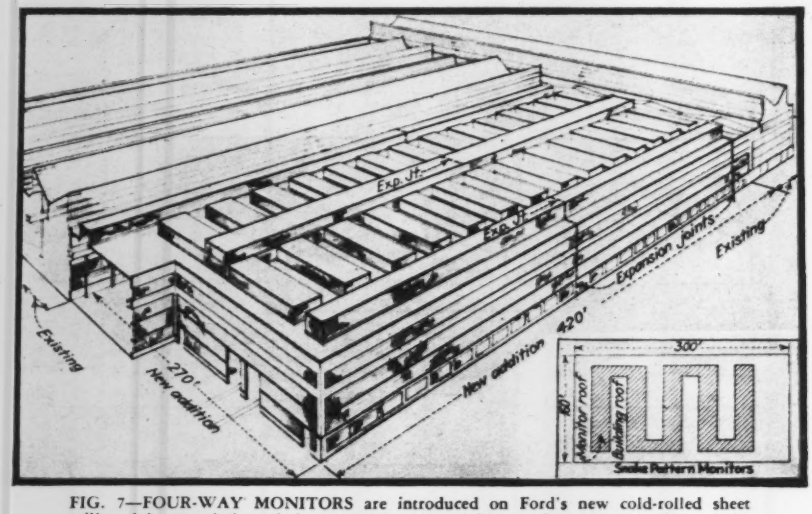


FIG. 7—FOUR-WAY MONITORS are introduced on Ford's new cold-rolled sheet mill and in a variation of the same (sketch at right) on the new press shop of the Briggs Manufacturing Co. in Detroit.

Improved ventilation is probably as important a characteristic of this roof design as is better lighting. With windows on four sides, a great variety of opening arrangements is available, to cope with wind directions. All monitor windows are motor-operated in groups. One-fourth of the north windows in the transverse monitors comprise one group, for example. Another group is composed of one-half the west windows in the west longitudinal monitor; it is important to provide for opening only a portion of the windows in long monitors because under certain wind conditions smoke discharged at one end may be drawn back into the building at the other end of the monitor. From the standpoint of ventilation, this roof design is unusually flexible; it permits air to be brought in and discharged at almost any point desired; it permits wide variation in the number of air changes per hour; and there are always openings available on the lee side for outflow and on the windward side for inflow.

The roof on the Briggs body plant is of the same basic design, but the transverse and longitudinal monitors are combined into a continuous "snake" pattern. Such a design was chosen because the relative narrowness of the building, which had extensive wall areas of glass, reduced the necessity for long lengthwise monitors. Five transverse monitors, 27 ft. wide and 22 ft. apart, joined at alternate ends by three longitudinal monitors 17 ft. wide, comprise this roof for a building 160 ft. wide by 300 ft. long.

A roof of quite different type was designed by the same architects for a new foundry for the Kelsey-Hayes Wheel Co. of Detroit. Here a mill-type building with skylights and ventilators was desired. Ventilating requirements were dominant, and careful studies were made to locate the ventilators at points of maximum smoke accumulation; at the worst places motor-driven fans were installed in the ventilators. A total of 60 ventilators, 24 to 80 in. in diameter, were installed on the building, whose plan dimensions are about 220x470 ft.

Bethlehem uses ridge monitor roofs for its new hot mill buildings and flat deck roofs (one high bay alternating with two low bays) on its cold finishing mills. Monitor openings over the slab-storage building are filled with pivoted louvres, while over the other buildings steel sash windows sloping outward are used. Ventilators of 72-in. diameter are used along the ridges of the monitor roofs of these buildings.

The roofs of all the buildings of the new American Sheet & Tin Plate plant are of sloping mill type with skylights and natural-draft ventilators. Skylights are held to provide better illumination than monitors, and in addition are said to be more economical. Ventilators function automatically regardless of the direction of the wind, and if of large enough capacity keep the buildings as clear of smoke as is possible.

For large low buildings many roof forms are used. Continental Can on its new building uses continuous A-frames, 10-ft. wide, spaced 20 ft. apart by a flat roof deck. The sawtooth roof is still popular because it provides fairly well distributed light without glare since the windows usually face north. It is, however, open to criticism from a ventilation

standpoint, since unusual and often unexpected suction or pressure conditions are created which cannot be met with windows on one side only. There is a tendency, according to George A. Bryant of the Austin Co., toward fixed windows in sawtooth roofs and the use of some other means of ventilation. The butterfly roof (a monitor with a V-shaped roof) eliminates some of the ventilation difficulties of the sawtooth but has proved costly to maintain, in Albert Kahn's experience. His preferred design is now a wide sloping-window monitor running along the center of each bay. Many monitors are too narrow either for efficient lighting or ventilation. Windows inclined at 30 deg. on the new Chevrolet plant in Baltimore provide better lighting than the vertical monitor windows on the adjoining Fisher Body plant, according to Mr. Kahn. On the other hand sloping monitors, particularly with top-hung sash, collect dirt more easily than the vertical type.

Additional General Motors experience, related by F. H. Linscheid of the Argonaut Realty Co., indicates that sawtooth roofs let in too much heat in summer and collect dirt too readily. With the usual inclination of the roof there is also a tendency for the gravel to slide off or for the tar or pitch to run; on one new building a flatter slope is being used in an attempt to eliminate these difficulties. In general, however, monitor roofs are preferred over the sawtooth design.

The monitor roofs used on both the Electro Motive Corp. and the Allison Engineering Co. plants achieve good lighting results. The Allison roof, with alternate high and low bays 46 and 30 ft. wide, respectively, has glass in all four sides of the monitors and furnishes the daylighting conditions shown in one of the accompanying illustrations. This is a low building. Electro Motive uses a similar design, with 24-ft.-wide transverse monitors spaced 12 ft. apart, for a tall building (50 ft. high to the crane rail).

Roof materials and designs

Important as roof form is from a lighting or ventilation standpoint, it is no more vital to ultimate roof satisfaction than the materials and details of construction. What is being done with materials and details on some of the modern industrial buildings is outlined in the following.

Bethlehem—Materials for sloping roofs of the hot mill buildings at Lackawanna are 20-gage asphalt-asbestos-covered sheets of standard corrugated type. Flat roofs of the hot mill utilize the same material in wide corrugation design, to provide greater strength for snow loads and to permit wider purlin spacing. The flat roofs of the cold-finishing mill buildings, where greater insulating qualities are desirable, are of more elaborate design. Here an 18-gage flat steel roof deck is covered with 1 in. of wood-fiber board and a 4-ply tar-and-slag waterproofing; a 20-gage deck is substituted over the motor room. In the pickler building the same design is used but with 20-gage covered sheets substituted for the bare steel deck because of the corrosive gases. A new detail adopted for all roofs in this plant is the use of an extra thickness of waterproofing at all points where water drops from a high to a low roof. No gutters are used because of ice and snow difficulties.

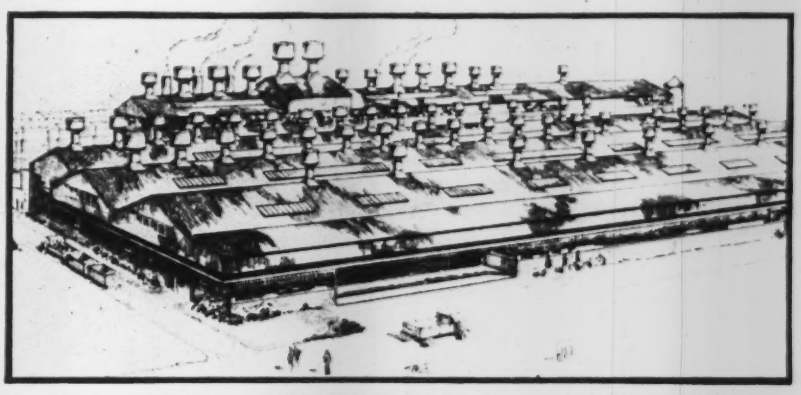


FIG. 8—VENTILATORS AND SKYLIGHTS feature the roof of the new Kelsey-Hayes Wheel Co. foundry in Detroit. Corrugated metal covered with asphalt-asbestos and sheathed in aluminum foil furnishes insulation and a unique appearance.

The office building in this plant utilizes an interesting roof composed of slag concrete poured on metal lath stretched over the joists to serve as forms. The topping is 1 in. of wood-fiber board covered with built-up roofing paper, mopped.

General Motors—Glazed cement tile, flat and channel cement tile and metal decks insulated with cork or fiber board, and a prepared type of waterproofing have been used on different branch plants and warehouses. At Charlotte, N. C., flat cement tile made with light aggregate is used. The Electro Motive plant is roofed with channel cement tile. Both are covered with waterproofing and gravel. The Allison Engineering Co. building in Indianapolis is roofed with boards on heavy timber stringers; the covering is 4-ply waterproofing, and special white marble chips are used in an effort to secure maximum heat reflection. A poured concrete slab is used over the dynamometer test building at this plant, but this is an exception to the company policy against poured roofs as presenting unwarranted construction difficulties. Although gravel covering of waterproofed flat decks is not always necessary, the Austin Co., which furnishes it on both of the above buildings, favors it for two reasons; it dissuades employees from using the roofs as playgrounds, and its use tends to assure the application of sufficient tar or pitch over the waterproofing.

U. S. Steel—All roof over the 45 acres of new plant of the American Sheet & Tin Plate Co. at Gary is of corrugated sheets of an alloy steel containing copper, silicon and chromium and having a 50,000 lb. per sq.in. yield point. This is a new departure adopted in the interests of greater corrosion resistance. The pickler building, where corrosion effects are a maximum, is roofed with asphalt-asbestos-protected sheets. The motor building uses a flat steel roof deck covered with asbestos sheets an l asphalt.

Other Roofing Practices—The roof of the new Ford steel mill is composed of light-weight channel cement tile covered with composition roofing and slag; slag is a company byproduct and in addition is favored on the basis that it sticks to the roof better than the rounded particles of gravel. The new Briggs building utilizes flat cement tile, composition roofing and gravel.

A new material adopted for the sloping mill type roofs of the Kelsey-Hayes Wheel Co. foundry (and for the upper half of the walls as well) is asphalt-asbestos-covered corrugated sheets sheathed in aluminum foil; a striking appearance and improved insulating properties are obtained. A similar material, but sheathed in electro-sheet copper instead of aluminum foil, is used for the crown of the A-frame monitors on the Continental Can building at Elwood, Ind. This building also utilizes flat-top cellular steel units for the roof deck which are tack-welded to the purlins and A-frames. Covering is fiber board and composition waterproofing. An unusual detail on the poured concrete slab roof of the Hershey Chocolate Co. building, Hershey, Pa., is the projection of the drain pipes 2 in. above the roof, the purpose being to keep a sheet of water on the roof at all times to serve as an insulator.

Industrial floors

Flooring materials, as with roof designs, vary not only with the individual preference of owners and engineers but also with the extremes of service to which floors are subjected. For one-story industrial buildings which house products that would be damaged by contact with hard floors, wood block on a concrete base is widely preferred. Thus, such floors are universally used in the cold-roll finishing buildings of the new steel-sheet mills. They are preferred also for many

other plants on the basis of resilience under workers' feet; however, where this is the only criterion of choice, maple flooring is often used. Smooth heavy-duty floors can now be built with 2-in. wood blocks as compared with 4-in. blocks previously required for the same loads. In the wood-block floor of the Addressograph-Multigraph Building in Cleveland, the H. K. Ferguson Co. left concrete squares around the columns and at the drinking fountains as an aid to keeping the wood-block floor intact and lowering its upkeep expense.

Most new steel-mill buildings and foundries use concrete floors, whereas not so many years ago dirt or cinder floors were often considered satisfactory. In its new pickler building at Gary, where acid conditions prevail, the American Sheet & Tin Plate Co. has installed a brick wearing surface over the concrete slab. In the annealing and shipping building where steel-tired trucks operate, aisles are paved with heavy steel plates bolted to the concrete slab; along either edge of these plates three or four lines of brick on flat are laid flush with the plate floor, the purpose being to provide an easily maintained junction with the concrete slab. Another special floor in this plant is found in the motor building where permanent steel forms of pressed-steel channel units carry an 11-in. concrete slab in which the maze of electric conduits is buried. The forms are welded to the supporting steelwork. The concrete slab surface is treated with a red-colored integral hardener in the interests both of appearance and freedom from dust. At the edges of the building the slab is turned up as a curb to facilitate cleaning and to permit a tight joint with the sandwich steel-sheet wall noted previously.

Concrete floors are used exclusively in General Motors branch warehouses and service depots; no hardeners or other special finishes are required because all traffic is rubber-tired. For hard surfaces, Albert Kahn has used a floor consisting of a 1½- to 2-in. topping of granite-chip concrete, which is ground to a smooth dustless surface with electric grinders.

Several types of prefabricated floors are being used in a number of new buildings to achieve special results. In the Hershey Chocolate Co. office building, precast gypsum floor arches, by virtue of their light weight, permitted a reduction in the amount of steel required in the frame and fitted in well with the gypsum block and slab furring used around columns and beams to hide the air-conditioning ducts. Composed of a gypsum beam spanning between floor joists 7 ft. apart and gypsum filler slabs spanning between the gypsum beams, this construction provides a smooth ceiling and a floor, including fill, only 6 in. thick.

Cellular steel floors are being used for a new office building of the Youngstown Sheet & Tube Co., for a new building at the Eli Lilly Co. plant at Indianapolis, and for a new printing plant building for

FIG. 9—UNDER SIDE of a cellular steel floor in the Herald Building, Sharon, Pa., featured by a conduit trough shown next to the girder.

the Sharon, Pa., *Herald*. In all of these, light weight and flexibility for electric wiring layouts are the objectives sought. In the Youngstown Sheet & Tube Building, a floor unit consisting of pressed-steel channel cells and a flat plate is used; in some rooms the plate is turned down to form a flat ceiling, in others it is turned up to form a flat floor, in which case the ceiling is of suspended type utilizing an acoustic tile. For the flat-ceiling installation a raceway or inverted metal trough is attached to the flat-plate ceiling along the walls of the room. This raceway encloses the main electrical supply lines and runs at right angles to the direction of the floor cells; special attachments or grommets are provided to be inserted in sub-punched holes (on 6-in. centers), which register with the troughs and furnish openings through which wires can be carried out into the room at right angles to the main electrical supply cables. Any floor trough may be used, so that machines or lights can be served at any desired point on the floor. Separate raceways are provided for telephone wires which also utilize other troughs than those occupied by the electrical wiring. The same construction is used in the Sharon-Herald Building.

The Eli Lilly floor is composed of keystone-shaped cells (channel construction both top and bottom). In this floor the main electrical supply ducts at right angles to the cells are placed on top and buried in the floor fill; special access units to the transverse floor cells are provided at intervals in the supply duct. Suspended ceilings of metal lath and plaster are used.

Partition practices

If one were to make a generalization on partition practices in industrial buildings, it would be that as few partitions as possible are used. Where they are required, light weight, re-use or salvage value and low maintenance are prime requisites. General Motors in all of its branch warehouses and service stations uses metal partitions in standard unit sizes. In the new Eli Lilly Building, toilet and duct-space rooms utilize partitions made of cement-asbestos board separated by rock wool. The boards come equipped with metal frame joints, and the rock wool is in bundles of exact wall thickness, so that erection is rapid.

The principal innovation that the Eli Lilly Co. has adopted since the depression is the use, amounting almost to a standard, of buff-colored glazed tile partitions and of facing of similar material for walls and columns. The glazed tile is easier to keep clean than painted plaster, and the use of small units makes it easier to cut holes in walls for pipes, etc., when that becomes necessary. Experience so far has indicated, according to William A. Hanley, director of engineering, that the difference in cost between glazed tile and plaster on clay tile is equalized after three paintings of the plaster.

Compressed shredded redwood slabs are used for partitions in the new office buildings of the Maytag Washing Machine Co. The slabs, 3 in. thick, are plastered both sides. A remarkably light partition with good soundproof qualities is said to result. All partitions in the new Owens-Illinois Glass Co. laboratory at Toledo utilize glass blocks; such partitions are finding increasing application in dairies, breweries, and more recently in general industrial buildings.

A new and interesting partition developed by the Chicago Vitreous Enamel Products Co. and recently installed in its laboratories at Cicero, Ill., as an interior wall lining utilizes enameled steel sheets in a large variety of colors and designs. Wall studs are 2x4 timbers with furring strips arranged to support the joints, some of which are faced with stainless-steel strips. The steel plate is 24-gage metal pasted to ¾-in. wood fiber boards which flattens the sheets, prevents sweating and insulates for temperature and sound; the wood fiber board is cut back along the edges of the sheets so that it fits around the furring strips. Special bar accessories are used at the joints, which facilitates the application of calking compounds. Where the stainless-steel strips are used, they are screwed to the sheets and are of such a form that they contain the calking compound; the manner of attaching the strips permits the sheets to expand or contract as necessary, the sheets virtually forming floating panels.

* * *

Part III, to be published next week, will deal with the designs of some of industry's new plant office buildings.

Research Notes

Current Studies at Lehigh University

By Inge Lyse
In Charge of Fritz Engineering Laboratory, Lehigh University, Bethlehem, Pa.

THE research investigations carried out at the Fritz Engineering Laboratory of Lehigh University are principally of a structural nature. Among problems investigated during the past year are: steel-plate floor systems, welded beam-to-column connections, concentration of torsional stresses at the fillets of structural steel sections (continuation of soap-film experiments on torsional rigidity of structural sections), structural welds subjected to combined bending and shearing stresses,

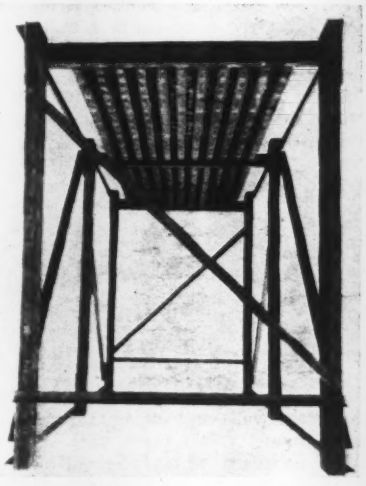


FIG. 1—MODEL of steel battledeck floor tested with varying thicknesses of plates and spacing of stringers.

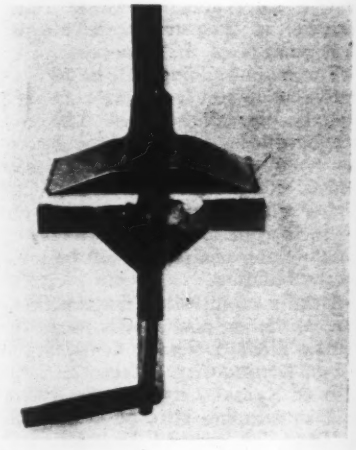


FIG. 2—WELDED clip-angle connection just before failure of weld, showing typically large deformation.

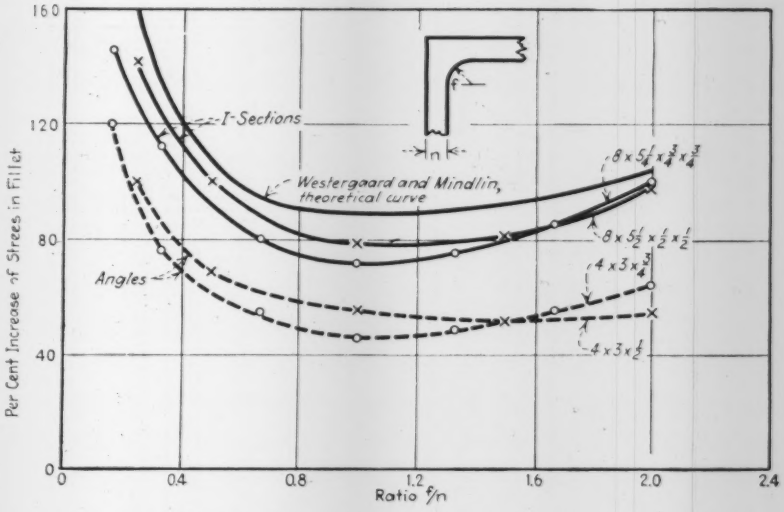


FIG. 3—STRESS CONCENTRATIONS in fillets of I-sections and angles as determined by soap-film experiments.

function of reinforcing bars in one-way reinforced-concrete slabs, behavior of two-way reinforced-concrete slabs, shrinkage of concrete and behavior of transmission towers. Some of these experiments have been completed or are near completion, while others have merely gotten under way.

Steel-plate floors

The investigated steel-plate floor systems have been of the so-called "battledeck" type. Four model floors of one-third the size of the prototype have been investigated to date. The floors consist of thin steel plates supported by I-beams. Several thicknesses of plate as well as different spacings of stringers have been studied. Fig. 1 shows the type of construction used.

The information that has been obtained on these models furnishes a basis on which to design a more economical steel floor and as a conclusion a full-sized floor panel, 10x20 ft., will be designed and tested during the next two months. The investigation is carried out in cooperation with the research committee of the American Institute of Steel Construction.

Welded clip angles

For the past two years investigations have been carried out on the behavior of welded seat angles. A natural extension of this project was the study of the full beam-to-column connections as used in welded structures. The introductory part of this study, that which deals with the action of the "clip" angle, has been investigated during the past few months. Most of the work has been done on a model basis, with the angles subjected to direct tension.

An illustration of the way in which these angles bent before the weld failed is shown in Fig. 2, which also illustrates the type of specimen used. Cantilever arrangements as well as full-sized beam-to-column constructions are also included in the program. The investigation is being carried out at the university in cooperation with the structural welding committee of the American Welding Society.

The study of torsional behavior of structural sections reported in the April, 1935, issue of the *Proceedings*, Am. Soc. C. E., brought out the lack of definite information on the concentration of shearing stress at re-entry fillets. An extensive study by means of soap-film experiments was conducted, and a summary of the results was presented as a discussion of the mentioned paper by F. L. Ehasz in the October, 1935, *Proceedings*.

An example of the relations between the size of fillet and the concentration of stress is shown in Fig. 3, from which is noted the agreement between the experimental results and the theoretical relationship developed by Professors Westergaard and Mindlin. Furthermore, the uniformity of the results demonstrates how successfully the

soap-film analogy may be applied to structural investigations when carefully done.

Shear and bending in welds

An experimental investigation of the behavior of fillet welds when subjected to combined bending and shearing stresses was recently completed, and the results were reported by N. G. Schreiner (American Welding Society *Journal*, September, 1935). One of the important conclusions was that the lightly coated electrodes (commonly termed bare wire) as well as the heavily coated electrodes gave ductility sufficient to allow for full rectangular distribution of bending stress at time of failure. It was also found that the full rectangular distribution of bending stresses developed at ultimate load even when the average shearing stress was as great as 80 per cent of the shearing strength, indicating that the presence of shear had only minor effect upon the bending strength of the weld.

Concrete shrinkage

An investigation was recently completed on the fundamental causes of shrinkage of concrete, and a report was published in the 1935 A. S. T. M. *Proceedings*. The outstanding finding was the direct relationship that exists between the amount of cement paste and the shrinkage of the concrete. The shrinkage per each per cent of paste in the concrete was practically independent of the cement content as well as of the water content. Rich and lean mixes showed practically the same shrinkage so long as they contained the same amount of cement paste. Thus the shrinkage could be expressed approximately by an equation:

$$s = k.\ p,$$

where s is the shrinkage of the concrete, k is a constant representing the shrinkage per each per cent of paste and dependent upon the materials used and the conditions of the test, and p is the percentage of cement paste in the concrete. Fig. 4 shows some of the results of this investigation.

An investigation is at present being carried out on the elastic behavior of transmission towers. The work is done in cooperation with the Bethlehem Steel Co., and it is hoped that the results will be of great assistance in the design of all types of structural-steel towers. The experiments will be made with relatively small-scale models, subjected to loading conditions comparable with those encountered in practice. Simplified sections of towers are being studied first as a preliminary to a more extensive program, which includes models of the actual towers.

These are the major problems that have been studied at the Fritz Engineering Laboratory during the past year. In addition to the laboratory staff, five Research Fellows, four of whom are supported by cooperating agencies, are at present engaged in the investigation of these problems.

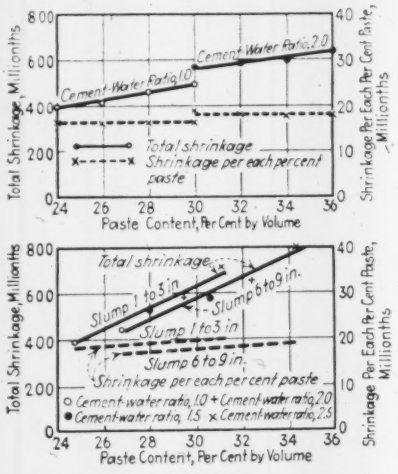

Total Shrinkage, Millionths
Shrinkage Per Each Per Cent Paste, Millionths
Cement-Water Ratio 1.0
Cement-Water Ratio 2.0
Total shrinkage
Shrinkage per each percent paste
Paste Content, Per Cent by Volume
Slump 1 to 3 in.
Slump 6 to 9 in.
Cement-water ratio, 1.0 + Cement-water ratio, 2.0
Cement-water ratio, 1.5 × Cement-water ratio, 2.5

FIG. 4—PASTE CONTENT, not cement or water, controls concrete shrinkage according to tests of which the above results are typical.

Concrete slab studies

The function of the reinforcing bars in reinforced-concrete slabs is being investigated in cooperation with the Concrete Reinforcing Steel Institute. Among the problems that will be studied [illegible] the effects of such items as the size [illegible] spacings of the bars, the yield-[illegible] stress (bars with yield-point stress [illegible] ing from 40,000 to 100,000 lb. per [illegible] in. are included), the strength of [illegible] concrete and the length of the spa[illegible] the slabs. Both simply-supported [illegible] continuous slabs are included in [illegible] program, and many have already [illegible] made and tested. Experiments [illegible] carried out on both types by testin[illegible] failure in the 800,000-lb.-capacity [illegible] ing machine.

The method of designing two-[illegible] reinforced-concrete slabs has brou[illegible] out considerable divergence in opin[illegible] of late among structural engineers, and building code recommendations show great variations. In order to secure more experimental data on the behavior of such slabs, the Portland Cement Association recently established a research fellowship at the Fritz Laboratory. The program for this cooperative investigation includes slabs varying in length-width ratio from 1:1 to 1:2 for supporting conditions varying from simple support along the four sides to fully continuous in both directions. The experimental slabs will be models of one-half the size of the prototype. They will be supported on heavy steel beams during the testing, to eliminate the effect of yielding supports, and the load will be applied by means of a water tank, the bottom of which consists of very thin, flexible sheet metal.

Mineral Springs Development by Missouri City

REALIZING that it was the only way in which to protect its natural recources of mineral and medicinal springs, the city of Excelsior Springs, Mo., decided to acquire the rights of the eight individual concerns and to develop the locality as a health resort. Through the PWA a combined loan and grant of $673,000 was obtained and secured by bonds sold to citizens. A special act of the legislature established the right of the community to enter this type of business and to convert park property into revenue-producing property. A total of about $1,000,000 has been made available, of which almost half will be expended on the erection of an architecturally modern building that will house baths, dispensary, bottling works and municipal offices.

Contracts have already been let for about 25,000 ft. of pipe line to carry the various waters from the springs to the hall. Because of the mineral content of the water, special pipes will be used in a number of instances. About one-half of the pipe, 13,000 ft., will be of wood-stave construction bound with nickel wire. There will also be 8,890 ft. of seamless copper tubing in the line. For use in the wells and springs, about 3,000 ft. of monel metal pipes will be used. Work includes the replacement of 4,000 ft. of present line and over 2 miles of trenching. Among the problems encountered in designing the pipe line is the necessity for keeping the iron manganese water under pressure of carbon dioxide, as exposure to the air causes precipitation of the minerals.

The main building will be faced with native stone and will have concrete and Indiana limestone trim. The smoke-stack will be treated as a decorative tower, 100 ft. high, with glass-brick panels extending nearly the full height. Glass brick and aluminum will be used on the top of the tower. Complete air-conditioning equipment will be installed in the building.

Details of pipe-line construction and reconditioning of the wells were worked out by Black & Veatch, consulting engineers, Kansas City. Keene & Simpson, also of Kansas City, are the architects, and landscaping is to be done by Hare & Hare. Thompson & Lichtner Co., Chicago, has been appointed management engineer in compliance with PWA regulations.

Mosquito-Control Procedure Defined as Engineering Problem

Control of mosquito breeding in Tennessee Valley reservoirs held vital to welfare of that region—Malaria epidemics occurring in seven-year peak cycles not confined to southern states—New larvicide gives temporary protection at outdoor gatherings

Courtesy of Newark Sunday Call

FIG. 1—AUTOGYROS are an effective modern weapon in the war on mosquitoes. The machine carries a spraying device to lay a barrage of larvicide over swamp areas and flooded land difficult of access.

THE MANNER and methods by which engineering knowledge can and should be applied to the problem of mosquito suppression were subjects of the 23d annual meeting of the New Jersey Mosquito Extermination Association held in Atlantic City on March 4-6. More than 150 engineers and public health workers from all parts of this country and Canada discussed control methods and results, the use of Civilian Conservation Corps labor, and the newly developed technique of temporary protection of outdoor gatherings from the mosquito pest. The speakers stressed the necessity for continued intensive effort directed toward mosquito suppression, not only for the promotion of greater comfort but as an essential safeguard to health in preventing the transmission of malaria.

Application of mosquito control is primarily an engineering problem, and one which offers much opportunity for research and development, said W. F. Cochran, executive officer and engineer of the Delaware Mosquito Control Commission, who described the studies of marshland drainage and control structures that are being carried on by his organization. Comparatively little fundamental knowledge of soil and hydraulic relationships affecting marsh runoff, seepage and drainage is available. General principles of ditch location and the theory and design of tide gates and spillways are among the engineering phases of this work that need further investigation.

The Delaware Commission was organized by state legislation in 1933, to supervise work done by CCC labor in two counties. Although activity is directed primarily toward mosquito suppression, this work has been successfully coordinated to improve conditions for the conservation of wild life. For example, muskrat propagation on one marsh has been increased 554 per cent in the last two years by drainage control that favored the growth of plants used by these animals for food. Muskrat fur is a valuable commercial pelt, and trapping operations represent a major source of income to residents of lower Delaware.

Malaria dangers

Cautioning against the popular fallacy that malaria is confined to the Southern section of the country, Dr. L. L. Williams, Jr., senior surgeon of the U. S. Public Health Service, stated that the disease can become epidemic in any part of the United States. Studies have shown that the malaria peaks occur in cycles about every seven years, and that the infection has frequently appeared in areas previously unaffected. At present the U. S. Public Health Service is directing anti-malaria work in fourteen states, employing approximately 25,000 men, and there has been a noticeable decrease in malaria incidence since the peak outbreak in 1935.

Few cases of malaria have come to attention in New Jersey within the past ten years, according to William H. McDonald, of the state department of health. However, the false sense of security in Camden County of that state, where no mosquito-control work had been carried on, was shaken last year when an outbreak of real proportions invaded a township area.

Dr. F. C. Bishopp, U. S. Bureau of Entomology, in reviewing mosquito activities in 1935, reported that the authorities of the TVA project recognize the potential dangers of malaria propagation from mosquito breeding in the vast bodies of water created by their dams. A special advisory board has been established to develop a program of control. At Wheeler Dam, 74 boats and 3 airplanes will be used for spraying larvicide, and in addition the lake levels will be fluctuated at weekly intervals to kill the shoreline vegetation, where mosquito larvæ find refuge from natural fish enemies.

New larvicide developed

Outdoor gatherings can be freed of mosquito annoyance by the use of a new larvicide developed by Joseph M. Ginsburg, biochemist at the New Jersey Agricultural Experiment Station, who described the technique of protection from mosquitos on the wing. The larvicide, a kerosene-pyrethrum extract, is sprayed as a fine mist over the meeting place and near-by area half an hour before the event is to begin. One treatment of this spray gives protection up to four hours, and if mosquitos appear later, another application can be made without injury to persons or their clothing. The larvicide either kills or incapacitates the mosquitos that it hits and successfully repels those that seek to enter the sprayed area. Tests in New Jersey, New York and Connecticut have definitely established this method as a successful new phase of mosquito extermination.

The extensive operations in New York

City to control mosquito breeding were described by Dr. John L. Rice, Commissioner of Health. In the salt marshes that form one-ninth of the city's area, 3,200 miles of drainage ditches have been constructed; the "checkerboard system" of ditching previously used has been supplanted by the parallel system, reducing installation and maintenance costs by one-half. One of the major activities of the department is a regular ten-day spraying program of more than 60,000 catchbasins, the potential source of mosquitos in the apartment-house districts. The 26 specially designed trucks used for this purpose and also for spraying ponds and swamp lands apply a larvicide emulsion in which an oil extract of pyrethrum is the active agent. Up to last year a light fuel oil costing about 6c. per gallon was used. The new larvicide, which is more effective, costs only 2.7c. per gallon.

Mosquito flight-range studies

In describing the work of the Des Plaines Valley (Ill.) Mosquito Abatement District, J. Lyell Clarke, sanitary engineer, stated that 50,000,000 mosquitos, stained red, green, yellow, blue and brown, will be "on the loose" in Cook County, Ill., this summer, when studies of flight range will be continued. The color staining is done by spraying mosquitos with aniline dyes. The mosquito fighter, equipped with a portable sprayer, will walk through the marshes, spraying the pests as they rise at the rate of 10 to 30 insects per square foot of area traversed. Commenting on the effect of sub-zero temperatures this winter, Mr. Clarke state that although great numbers of hibernating "house" species of mosquitos that find refuge in catchbasins and sewers were frozen, this had not materially reduced the prospects for a large 1936 mosquito crop. Eggs of salt-marsh and upland varieties were unaffected by the cold.

In reporting on the economic benefits of mosquito suppression, aside from the curtailment of human and animal diseases, Dr. Thomas J. Headlee declared that the efforts of New Jersey to reduce mosquitos have added a half billion dollars in taxable realty values to the state in the period of 1915 to 1930. Urging continued promotion of control efforts, he stated that there are 18,000,000 persons living within 150 miles of the resort centers of the state, and that these will be more strongly attracted to the resorts if they are maintained free of the mosquito pest.

Although control work was seriously crippled throughout the country during the depression years, federal aid and in particular the CCC camps assisted materially in preventing the complete collapse of anti-mosquito work. Several speakers stated that the efforts of the Conservation Corps were highly satisfactory and compared in efficiency with the work done by seasoned men. For example, in Delaware the average amount of marsh muck handled per man per day (6½ hours) was slightly more than 11 tons.

FIG. 2—CLEANING a drainage ditch of vegetation, so that the mosquito larvæ find no refuge from their fish enemies.

Canada is continuing an aggressive and widespread campaign against the mosquito pest, according to Dr. A. [illegible] Gibson, Dominion entomologist. Government funds for the work are limited, but local groups are quite active in sponsoring measures for suppression. In Winnipeg last year the annual [illegible] day conducted by the women of the city to raise funds for mosquito fighting netted more than $4,000.

Representatives of the U. S. Biological Survey present at the meeting spoke in the interests of wild-life conservation and asked for suggestions so that their activities would not conflict with the operations of the mosquito fighters. It was felt that by a better understanding of the mutual problems the two interests could be harmonized.

Officers elected for the coming year are Dr. James H. Rosecrans, president; David Jenkins, first vice-president; Charles W. Holton, second vice-president; Thomas J. Headlee (re-elected), secretary; Thomas G. Mulhern, assistant secretary; and Lewis B. Jackson, treasurer.

Field Work Progresses on Central Valley Project in California

PROGRESS on California's Central Valley project, which is now in the hands of the U. S. Bureau of Reclamation, thus far has been confined largely to preliminary work. Under the direction of Walker R. Young, construction engineer at Sacramento, field and office forces early in March numbered 185 and were engaged in carrying on survey and exploratory programs on the Kennett, Friant, and Contra Costa division. (*ENR*, Oct. 17, 1935, p. 552, an outline of early progress).

Of the money now available $5,500,000 has been tentatively allocated to the Kennett development, $2,500,000 to the Contra Costa conduit, and $5,000,000 to the Friant Dam and canals diverting therefrom. Because relatively little excavation will be required at Friant Dam site, it is likely that some of the money available for work in this division can be used in placing concrete in Friant Dam. Of the allocation to the Kennett division, $5,000,000, will be used to begin relocation and reconstruction of railroad and highway that will be flooded by Kennett Reservoir, while $500,000 will remain for expenditure upon designs, exploration and other preparatory work at the dam site.

Foundation exploration under way at the two dam sites includes tunnels, calyx drilling and diamond drilling. Exploration of suitable sources of concrete aggregate materials is under way in the vicinity of both dam sites, and camp sites are being studied. At Kennett, topographical surveys of the reservoir had previously been made by other governmental agencies, and survey crews under direction of the Bureau are now making final location of the 33 miles of Southern Pacific Ry. line which the bureau contemplates relocating.

On the Contra Costa conduit estimates made previously by the state were based on a capacity of 120 sec.-ft. Whether or not this will be changed has not been determined. Preliminary surveys by bureau crews contemplate a conduit location along the foot of the hills south of Suisun Bay and include pumping plants at five locations to lift water from the river level into the conduit.

Plans and specifications are being prepared in the office of the chief engineer at Denver as fast as circumstances will permit. Just which units will be first advertised for construction will depend upon which can be gotten ready for construction first.

The following features are under consideration concurrently for early construction: railway construction around the proposed Kennett Reservoir, camp construction for work on the Kennett division, camp construction for work on the Friant division, first unit of construction at Friant Dam, first units of construction of the two main canals leading from Friant Dam, and the Contra Costa conduit in the vicinity of Antioch.

High-Strength Metals for Construction Service

Data on many of the modern ferrous and non-ferrous alloy materials are presented at meeting of A.S.T.M. in Pittsburgh

THE PROGAM of five papers that furnished a break on March 4 in an otherwise full week of committee sessions at the spring regional meeting of the American Society for Testing Materials in Pittsburgh was billed as a symposium on high-strength constructional metals. Actually the word "constructional" was used in a very broad sense, for only a few of the metals discussed have yet been used in construction. On the other hand, some of these materials have important potentialities in the construction field—as distinct from railroad-car building, airplane manufacture, chemical equipment assembly and the like—and a few of them have been used in bridges, buildings and other structures and in construction equipment. Three papers considered non-ferrous alloys of aluminum, magnesium, copper and nickel, and two were concerned with alloy steels.

Aluminum and magnesium alloys

Although the strongest commercial wrought alloys of aluminum and magnesium have ultimate strengths of not more than 70,000 and 55,000 lb. per sq.in., respectively, the high ratio of strength to weight of these materials places them in the class of high-strength constructional metals. E. H. Dix, Jr., and J. J. Bowman, of the Aluminum Research Laboratories, presented much useful information on these two alloys. The high strength of these alloys is obtained by heat treatment. There are two kinds of heat treatment, technically known as solution heat treatment and precipitation heat treatment, respectively. In the former, heating the alloy at the proper temperature puts the soluble alloying constituents into solution, after which a rapid quench produces a supersaturated solid solution at room temperature. In the latter, strength increase is obtained from spontaneous precipitation of finely dispersed particles from the supersaturated solution at room temperature after heating at a relatively low temperature in the presence of copper or magnesium silicide as a hardening agent; this is also known as artificial aging.

The two best-known alloys for constructional purposes are designated as 17S-T and 27S-T. The letter S designates the wrought form (a carry-over from the time when wrought alloys were used principally in sheets), while the letter T refers to the fact that it is fully heat-treated temper. The number refers to the alloy composition. The 17S-T is duralumin. The alloy 27S-T is characterized by an exceptionally high yield strength and good resistance to corrosion and is used primarily for rolled structural members requiring these properties. Although not readily formed cold, this latter alloy can be heated for as long as half an hour at a temperature as high as 400 deg. F. for hot forming, without affecting either the mechanical properties or its resistance to corrosion. It has found its principal commercial applications in bridges, large dragline buckets and, to some extent, truck bodies.

For applications requiring high-strength material and exceptional resistance to corrosion, Alclad 17S has been developed, which consists of a core of 17S coated on both sides with a metallurgically bonded layer of high-purity aluminum. Another highly corrosion-resistant alloy is 53S, whose principal field of use has been in marine service. It is also used for window sections and decorative trim, in which case it is given a hard oxide coating to resist abrasion and corrosion.

An aluminum-magnesium cast alloy, 220, has been used extensively on large dragline buckets, where it is subjected to unusually severe conditions.

Welding is not generally recommended for the heat-treated alloys. Most aluminum alloys when used for structural purposes are given the same sort of paint protection that is used for other structural materials.

The magnesium alloys have been largely used in aircraft, where their light weight is especially advantageous. Their strength compares favorably with the strength of most aluminum castings. Practically all wrought magnesium alloys are available in the form of extruded shapes. They are not corrosion-resistant under saline conditions, but resist inland atmospheres very well.

Alloys of copper

A paper by C. H. Davis, metallurgist, The American Brass Co., considered those alloys of copper which contain at least 50 per cent copper. Strengths vary from that of the pure copper at about 30,000 lb. per sq.in. to that of hardenable alloys reaching over 200,000 lb. per sq.in. Zinc is the most common and widely used of all the alloying metals, brass being a copper-zinc alloy. Bronze, which contains tin as the secondary material, is one of the oldest known copper alloys. Other metals added to the copper-tin series are zinc, nickel, cadmium and aluminum. The best-known alloys of nickel copper have been those containing a high proportion of zinc. Because of their white color they are known as nickel-silver alloys. Silicon is one of the elements more recently introduced into copper and is usually accompanied by a third element, such as manganese in Everdur. The present trend toward corrosion-resistant materials of high strength indicates a continuing development of heat-hardening copper-base alloys, the best known of which is beryllium copper.

Copper-base alloys are used for both interior and exterior trim of buildings. Bronze doors and wall panels are usually 85 per cent copper and 15 per cent zinc. This alloy matches fairly well in color with the architectural bronze containing only 55 to 58 per cent copper. Where a silvery white corrosion-resisting material is desired for architectural shapes, a 13 per cent nickel extruded alloy is employed, but cold-rolled, drawn and formed shapes are produced in other more ductile nickel alloys, containing usually more than 18 per cent nickel. Copper alloys containing up to about 3 per cent silicon, with additions of manganese, zinc, iron, etc., may be fashioned into sash, casings, angles, air-conditioning equipment, air-exhaust ducts and other articles. Because of their high strength these alloys are being recommended to replace light ironwork for fire escapes, etc., where atmospheric corrosion results in hazardous conditions. The silicon alloys are readily welded.

Aluminum bronzes, also employed architecturally, contain 90 per cent copper, 9.5 per cent aluminum and 0.5 per cent iron. Everdur has found application in sewage-treatment plants. For expansion and bed plates of bridges, cold-rolled phosphor bronze plates are widely used. Silicon-manganese bronze finds an interesting use in the wire required for flexible concrete mats for levee and bank protection on the Mississippi River.

Discussers of this paper stressed the fact that emphasis should be placed on the elastic limit instead of the ultimate strength in considering these high-strength materials. Modulus of elasticity is another important characteristic that must be known and is not generally emphasized.

Alloys of nickel

Three compositions of nickel materials—pure nickel, Monel metal (nickel and copper) and Inconel (nickel and chromium)—were discussed in a paper by G. F. Geiger, of the International Nickel Co. Nickel was rolled as early

PHYSICAL AND CHEMICAL PROPERTIES OF HIGH YIELD-POINT STEELS

Properties	Cor-Ten	Man-Ten	Sil-Ten	Yoloy	RDS-1	RDS-1A	Hi Steel	HT-50	Aw-70-90-A	Aw-70-90-B	Jalten	Gr City 1	Gr City 2	Centralloy
C	0.10	0.35 max.	0.20–0.40	0.08–0.22	1.12 max.	0.30 max.	0.12 max.	0.12 max.	0.25 max.	0.25 max.	0.35 max.	0.14	0.20–0.30	0.08–0.30
Mr	0.10–0.30	1.25–1.70	0.40–0.80	.....	1.00 max.	1.00 max.	0.50–0.70	0.15–0.90	0.75 max.	0.75 max.	1.25–1.75	0.70–0.90	1.20–1.60	0.60–0.90
Si	0.50–1.00	0.10–0.30	0.20 min.	.....	.....	.....	0.30 max.	Trace	0.25 max.	0.25 max.	0.30 max.	0.15–0.20	0.15–0.20	0.50 max.
Cr	0.30–0.50	0.01–0.25	0.01–0.25	1.0	0.5–1.5	0.5–1.5	0.9–1.25	0.30–0.80	0.30–0.50	0.30–0.50	0.40 min.	0.25–0.30	0.25–0.30	0.40–0.60
Ni	.....	.....	.....	2.0	0.5–1.0	0.5–1.0	0.45–0.65	0.30–0.80	0.25 max.	0.25 max.	.....	.....	.....	0.25 max.
Mo	.....	0.00–0.40	.....	.....	0.20 max.	0.20 max.	.....	0.05–0.25	.....	.....	.....	.....	.....	Trace
P	0.10–0.20	.....	.....	.....	.....	.....	0.10–0.15	0.05–0.15	0.08–0.10	0.08–0.10	.....	.....	.....	.....
Cu	0.50–1.5	.....	.....	.....	.....	.....	.....	.....	0.25 max.	0.25 max.	.....	0.12	0.12	0.25 max.
V	.....	0.00–0.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tensile strength	75,000	90,000	90,000	80,000	75,000	90,000	75,000	70,000	90,000	65,000	80,000	80,000	105,000	75,000
Yield point	60,000	55,000	45,000	60,000	60,000	70,000	65,000	50,000	70,000	50,000	50,000	70,000	85,000	60,000
Elong. (2 in.)	25	20	18	44	25	18	20	28	20	25	20	19	12	25
Reduc. in area	.....	.....	.....	60	.....	.....	68	.....	.....	.....	.....	.....	.....	.....
Impact (ft.-lb.)	60 Izod	40 Izod	.....	41 Charpy	75 Izod	50 Izod	40 Charpy	.....	50 Izcd	50 Izod	40 Izod	.....	.....	.....
Endurance limit	45,000	40,000	.....	.....	.....	.....	49,000	48,000	.....	.....	40,000	.....	.....	.....
Hardness	.....	.....	.....	85 Rockwell B	.....	.....	85 B	.....	.....	.....	.....	90 B	95 B	.....

as 1873. Monel metal was first introduced in 1905, while Inconel has been available only since 1931. All three are white metals that do not readily tarnish in air or at ordinary temperatures. Since the coefficient of linear expansion of nickel is very close to that of mild steel, nickel-clad steel has been developed. Commercial cladding runs from 10 to 20 per cent of nickel.

The densities of the three metals, 8.85, 8.80 and 8.55, respectively, were emphasized as being important in establishing their corrosion resistance. Nickel has excellent resistance to corrosion in sea water, provided the water is not stagnant. The excellent record of nickel as turbine blading is attributed to its resistance to wet and dry steam combined with its mechanical properties. Although nickel discolors, its corrosion rate is extremely low.

Monel metal has very high corrosion resistance in either indoor or outdoor atmospheric exposures. The roof of the Pennsylvania Railroad Station in New York, covered with Monel sheets 0.025 in. thick 30 years ago, is still unaffected.

Low-alloy steel

In the past three years a number of proprietary low-alloy steels of high strength have been introduced on the American market. Developers of the new steels have so far apparently concentrated on serving potential and in some cases actual demands of the railroads for light-weight rolling equipment, principally freight cars, although the steels have gradually been accepted for other services. They divide generally into two classes—chrome-copper and nickel-copper steels, as is evident in the accompanying table. Of the proprietary steels now available, all are relatively costly, and some are still in the development stage. A paper by E. F. Cone, editor, *Metals and Alloys*, covered much of the available information about these new steels. In a second paper in this group, E. E. Thum, editor, *Metal Progress*, provided an analysis of the corrosion-resisting steels of the stainless type.

The new low-alloy steels are known as high-tensile steels. Mr. Cone raised a question as to whether they should not be called "high-yield-strength steels," since an essential property seems to be a yield strength averaging not less than 50,000 lb. per sq.in. He also pointed out that some of these steels are not alloy steels at all, according to the recently announced classification of the American Iron and Steel Institute, and suggested that this classification should be broadened.

High-elastic-limit steels have of course been extensively used before in the structural field, particularly the silicon structural steels, the nickel steels and the medium manganese steels. These new steels, on the other hand, have not yet been applied to construction service. The first one appeared about seven years ago as Cromansil and was made by the Electro Metallurgical Corp., which produces ferro alloys and other steel-making materials. In general, its composition is chromium 0.50, manganese 1.20 and silicon 0.75. It is now available with copper. It is readily welded, in which case it is recommended that the carbon should not exceed a maximum of 0.14 per cent. It has an ultimate tensile strength of 75,000 lb. per sq.in., and a yield point of 50,000 lb. per sq.in. The largest tonnages of this steel have been used in the oil industry for casings. It has also been used for trucks, engine frames and other parts of light-weight trains.

Of the other proprietary steels (shown in the table) all have been put on the market since the fall of 1934 with the exception of those of the U. S. Steel Corp., which were introduced three years ago. The companies and the names of the steels are as follows, approximately in the order in which they have been introduced:

U. S. Steel Corp.—Cor-Ten, Man-Ten and Sil-Ten.
Republic Steel Corp.—RDS grade 1 and RDS grade 1A.
Allan Wood Steel Co.—A.W. 70-90 A and A.W. 70-90 B.
Central Iron & Steel Co.—Centralloy medium and Centralloy high.
Youngstown Sheet & Tube Co.—Yoloy.
Granite City Steel Co.—HS grade 1 and HS grade 2.
Jones & Laughlin Steel Corp.—Jalten.
Inland Steel Co.—Hi-Steel.
American Rolling Mill Co.—Armco HT-50.

Mr. Cone presented some general comments. He said that an outstanding characteristic of these numerous high-elastic steels (seventeen grades in all) developed by steel companies is that for the most part they may be regarded as improved copper-bearing steels. In five of them and to a lesser degree in two others nickel enters as an important factor. Molybdenum also comes into the picture in at least four types. In several of them the presence of chromium is considered essential, and in one vanadium is found.

An interesting and significant fact is the extent to which phosphorus as an alloying element has come to be regarded. In four of these steels the percentage of phosphorus stipulated averages 0.10 to 0.20 per cent.

Stainless steels

The part of Mr. Thum's paper of primary interest to civil engineers concerns the 18-8 stainless steels (18 per cent chromium and 8 per cent nickel). They comprise about one quarter of the total high-chromium alloy production of the country, which amounted to 75,000 tons last year. Important fields of use are railroad passenger cars, sewage tanks and pipe, and turbines and pumps.

These steels are highly corrosion-resistant except in sea water, where they have been known to pit badly. The Navy has discontinued using them for all top-side construction, but Mr. Thum believes that eventually a means will be found to make these steels chloride-resistant—for example, by using more manganese, silicon, molybdenum or copper.

Much stainless steel has been used successfully in power plants. Pump shafts up to 25 ft. long and 10 in. in diameter have been made. Valve stems of 18-8 covered with a welded-on layer of stellite at the seating surfaces are widely used. Runners for water turbines and entry nozzles for steam turbines also utilize the metal.

The 18-8 steel responds to cold rolling and wire drawing, providing a high-strength material that can be used in thin sheets without allowance for atmospheric corrosion. Such a use is exemplified in the high-speed trains of the past few years. In the design of these trains the continuous roofs and floors are utilized as top and bottom chords of a large box beam, and trusses are used

along the sides to take the shear stresses. Jointing difficulties have been solved by a special form of spot welding, using only enough time and heat to from the welds and to reheat or soften only the smallest possible volume of adjacent metal. This is important because these steels start to precipitate carbides from the solid solution if held at temperatures above 800 deg. F.

When intended for car building, 18-8 is supplied in coils of strip cold-rolled to a minimum tensile strength of 150,000 lb. per sq.in. The strip is then put through a series of rolls, to form various elements of closed structural sections. Web members usually are corrugated to prevent buckling, and compression flanges need to be stiffened. All flat areas in compression must be supported or stiffened either by corrugations or auxiliary members.

In order to cut down the cost of large equipment made of stainless steel, various metal-clad materials have been promoted. These have found use in sewage-treatment plants, in one case 150 tons of clad steel plate being fabricated into a large air main for an activated sludge plant.

Letters to the Editor

Agencies of Highway Safety

Sir—The article in *Engineering News-Record*, Dec. 26, 1935, p. 891, on safety as a major problem and the accompanying editorial are an interesting continuation of the safety congress recently held under the President's call. Seventeen years in the actual design, construction and maintenance of pavements and highways, and several more years in the study thereof—and, of necessity, the study of traffic—may entitle the writer to some consideration of this safety question.

There are in both the article and editorial a few lines which should be continually kept in mind. In the article by Mr. McDonald these are: "In general, we are not reducing to effective action what we know to be sound and are not carrying on adequate research to clear our blind spots in traffic control." In the editorial they are: "Even were causes known, there is today no organization with a view to eliminating them. Machinery for driver education and control (and as final resort, punishment) exists in only part of the states, and even there it is only partly operative. An operating department is as essential to the administration of public highway systems as are construction and maintenance departments; yet no state has even the semblance of such an agency."

The state of New York, because of its population, wealth and size, has been one of the major highway builders of the Union. Outside its cities the state has spent probably well over a quarter of a billion dollars during the last 30 years for construction and maintenance, and the counties and towns have spent many millions more. Without considering the cities the expenditures for this work will approach, if not exceed, $500,000,000, but, with this high expenditure made under rapidly changing highway-transport conditions, the expenditures for research have been practically nil. About twenty years ago the state highway commissioner started the collection of data relative to type, cost and condition of the then-improved roads. This work was soon abandoned as there was a change in the state administration.

For many years the state testing laboratory was a place in which sand, stone, cement, asphalt, brick, etc., were examined only for the purpose of learning if they met the arbitrary specifications. During this time the expenditure for improved roads was rapidly increasing and running into more and more millions each year. As traffic increased in volume, weight and speed curves were being flattened, widths and thickness increased and signs multiplied, all on practically nothing but hope. Research, which all large corporations were finding necessary, was considered a needless expense not only by New York but by many of its neighbors. Research was left to the college, the materials men and the insurance companies, or any organization that would do it without expense to, or enlargement of, the state budget.

The preceding statements are made from the writer's personal knowledge of New York conditions over a period of fifteen years; with one possible exception they apply equally to New York's neighbors.

The creation of an operating department is a suggestion worth careful study. The study of today's traffic brings the realization that it presents problems which are, in some respects, more intricate than those of any other mode of traffic. Each vehicle has an individual driver; many are traveling at express speed; they are traveling upon an unlimited track with no rails to keep the vehicle in its proper line and with no automatic devices to stop it.

The most potent cause of accident, also the most difficult to segregate and control, is the driver. We might take a leaf from the experience of our ancestors; they did not permit inexperienced men and women, boys and girls to drive a valuable team of horses, yet we permit children, morons and what-have-you to take the control of 40 or 60 brainless horsepower and then get excited because 30 or 40 thousand, among 120 million, are killed. The astonishing thing is that so few are killed.

It is interesting to note that nearly one-third of the article is taken up by Mr. Lawton's paper on railroad-highway grade-crossing elimination and that very little is said about the driver of the machine. As the best records available show that only 4.3 per cent of automobile fatalities happen at railroad crossings, it is difficult to find any sane basis upon which the $300,000,000 was voted. One sometimes wonders what would have been the result in death reduction if one-tenth of $300,000,000 had been spent in education, strengthening the police power and cleaning the local courts.

Operating department—research? Yes. The first means the use of the instruments that we now have, and the latter means the creation of new instruments and the proper application of both.

Buffalo, N. Y., Jan. 1, 1936. T. M. RIPLEY, Consulting Engineer.

Foundation Auger at Fort Peck Dam

Sir—In your issue of Jan. 9, p. 38, you show pictures of my auger as it was used on the Fort Peck Dam spillway-gate structure. In this article you make no reference to the fact that this drill has been in use for three years, nor to the fact that it is a patented machine, nor to the fact that these holes were drilled under a subcontract.

This drill was developed on the St. Louis Auditorium job in 1932 by the writer. We bored 300 holes there through clay, most of them 4 ft. in diameter, and some as large as 7 ft.

We also used this drill on the Kansas City Court House, on the Kansas City Auditorium and on government work in San Antonio, Texas. We also drilled the caissons for the Kensington High School, Buffalo, N. Y., and the caissons for the new Beef Packing Plant for the Armour Co., of Chicago, and it is now being used in the construction of the caissons on the new Federal Court House, Buffalo, N. Y.

In all, this drill has been used on more than 4,000 holes in size from 18 in. to 7 ft. in diameter, and from 25 to 60 ft. in depth.

Some changes were made on the drill in Montana in order to increase weight and to enable us to use a 40-hp. motor in place of the 20-hp. motor which is standard on most jobs. These changes, which consisted of changing from a worm drive to a straight-gear reduction, were made in the field, as was natural, as the Fort Peck job is 800 miles from the Twin Cities.

Buffalo, N. Y., Jan. 15, 1936. D. M. HOLLINGSWORTH, The Excavating and Foundation Co., St. Louis.

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Where Refinement Pays

THERE is a point of any undertaking beyond which refinements in design of the structures do not pay. In a small structure the cost of changing the design and rearranging the structural units to meet small changes in load conditions will usually offset any economies in materials because the total savings are small. On the other hand, in large operations little savings that would not be significant on a small undertaking may warrant unusual design refinements. The siphons of the Colorado River Aqueduct are a good example. Those siphons have a total length of over 24 miles and have to meet many different load conditions, as described in this issue. Under such circumstances, a design of pipe shell that might be applicable for only a few feet on a small structure becomes applicable for many hundred feet and so makes it economically advantageous to modify the cross-section or the reinforcement. Thus, the engineer who undertakes the design of any structure must not only know how to apply engineering principles but must also know enough of the economics of construction to determine correctly where refinement in design ceases to be profitable and becomes wasteful and wrong.

State and Federal Partnership

WITH THE TRANSFER last year of the Central Valley project in California from state to Federal Reclamation Bureau control, all question about proper supervision of the federal expenditures therein was automatically answered. Any wish to eliminate state agencies from proper cooperation in carrying out the project should also have vanished. California has spent considerably more than half a million dollars in studying and planning for the developments which the Bureau now is undertaking, and not all of the information that it has thus obtained is in tangible form—designs, reports and options that can be turned over to the Bureau without more ado. Behind the items of tangible data are years of experience gained in living with the problem: acquaintance with water duty and with the different kinds of soil involved, and, not least, the great advantage that arises from close acquaintance and good will. Therefore, in the broader aspects the state can offer much useful cooperation to the federal forces in developing this great water-supply project. For fifteen years the state has been working on the idea; if the undertaking is carried out the state will be vitally interested in its success so long as it continues to operate. This fact alone is sufficient to suggest that it would be highly advantageous to evolve some cooperative plan whereby the Bureau would remain in control of the expenditure of funds and direct the engineering work, while state officials would serve as agencies through which the people of the state may aid in working out the necessary business and economic policies as well as in managing and operating the units put in service. Through such a joint program the long interest of the state in this project would be expressed in responsible participation. Partnership of federal and state agencies in a common purpose has never before had such fair opportunity.

Policing Underground Waters

UNDERGROUND WATER SUPPLIES and underground storage come more and more into focus as there is new development in semi-arid areas and as demand for more water arises in areas where conservation is important. By reason of quite special need for protecting artesian supplies, New Mexico has taken the lead in underground conservation of a sort peculiar to the water problem of the Pecos Valley; its work was mentioned and commended recently by O. E. Meinzer, of the U. S. Geological survey (*ENR*, Aug. 9, 1934, p. 167). The state itself, through the agency of a conservation district formed for the purpose, has developed its own technique in putting a stop to wastage from an important artesian storage basin. The interesting processes of doing the work are described in this issue. They are remarkably simple and effective and hold out encouragement to further study and improvement along these same lines. While conservation of artesian water is not new, neither has it ever advanced to a high degree of refinement. The Pecos Valley work, therefore, as a forward step will be found a valuable model for many other artesian districts where neglected or ruined wells are causing serious loss.

Making Progress

REGISTRATION of 6,200 persons at the Greater New York Safety Conference last week is obvious proof of the continuing interest in the safety movement, an interest that never lagged during the depression period. The remarkable attendance also reflects the truth that safety after all is a local problem. Safety education and promotion may be national issues, but the application of safety principles is essentially local in character. The success of the New York meeting can be attributed to two facts: First, the three-day program, with 35 separate sessions, provided something of interest for nearly everyone concerned with safety, regardless of position, type of work or industry. Second, several open-forum meetings gave opportunity for the individual to discuss his particular problem with a panel of experts and with others having similar problems. A program full of live topics chosen for their immediate interest rather than for an opportunity for the speakers to expound their own pet theories, and in addition providing for forum discussion of even the most troublesome questions, is bound to be a success. Unfortunately, the construction session was limited to the building field. The great field of heavy construction, which has done so much in safety and yet has so much left to do, needs further safety work even more than building. But safety marches on; construction is making progress, as is evidenced by the record of current work—the San Francisco bridges, the Colorado River Aqueduct tunnels, and many other projects that are making history.

Supply Hazards

JUST HOW COMPLETELY the maintenance of safety in water supply is dependent upon competent, ever-vigilant technical control speaks clearly out of the able report of F. H. Waring on the recent Coshocton epidemic. Though the report does not in terms assign a

definite cause, it carries so clear an inference of well-pollution hazards and the further potential hazard that lies in cross-connections with polluted industrial supplies as to leave no question concerning the lesson to be drawn. A well field exposed to river flooding and in-leakage of polluted waters does not offer the assurance of safety that a community water supply requires. Under the circumstances the recent improvement project, under which filtration was to be put off to a later date, should by all means be amended to provide filtration at once. Pollution hazards in many supply systems are numerous enough to make safe water quality more than a mere matter of automatic plant functioning; skilled technical supervision superimposed on purification plant adequate for all emergency requirements is the necessary minimum for safety.

Engineers Needed

A SPLENDID EXAMPLE of applied engineering in a field of endeavor that has received little attention from engineers was contained in reports on procedure employed in mosquito control as presented at the meeting of the New Jersey Mosquito Extermination Association last week. Aerial surveying, ditching, construction of tide-gate structures, reservoir clearing and water-level regulation are some engineering phases of the control measures that are being applied with marked success.

Scientists have studied the biology of mosquitoes with painstaking effort and, though they admit that much remains to be learned, they have catalogued the habits and vulnerability of the insect pests in highly useful manner. Thus, the main directions of control procedures have been determined, but the physical and economic application of these procedures is a matter that calls for the trained abilities of the engineer.

Marshlands and shallow borders of ponds and reservoirs are ideal breeding places for the hordes of insects that plague untold millions of people each summer. It is to these areas of low-lying land that the mosquito fighter devotes his major construction activity—largely one of drainage. But the theory, location and design of drainage structures, the fundamental characteristics of marshland soils, and the hydraulic phenomena that bear on efficient layout of control works, are still vague and imperfect.

It is in the solution of such problems that the engineer can render further service and extend the scope of his usefulness. Mosquito control is an activity of paramount economic significance; in New Jersey, where a control program has long been operative, more than half a billion dollars increase in real estate taxables has resulted from the campaign to rid the state of this troublesome pest. The possibilities for fundamental research and further development of practice offer an invitation and challenge to the engineering profession.

In this battle of man against his formidable insect pest the cooperation of natural scientists, physicians, biologists and public officials is of course indispensable. The engineer, however, being concerned in the very practical matter of conducting the actual warfare, ultimately carries the chief responsibility. The principal control measures are engineering operations, and their efficiency determines the extent of control that is economically feasible.

Engineers are concerned not alone in the field work, however. Other important phases of the problem demand their attention. Its intimate relation to water conditions requires that the risk of creating breeding places be considered in all water planning, whether for drainage, storage works or river changes. The fact that mosquito work must be regular and continuous—as emphasized by the current outbreak of malaria in the Camden vicinity and other recent epidemics of the same disease elsewhere—means that in framing works programs and budgets the needs of mosquito control require regular provision. And in these programs it will usually be essential to coordinate the work of adjoining governmental units, at the risk of failing to realize the sought-for protection.

Much still remains to be done to build up an efficient art of control. Though the scientific basis has been fairly well laid, engineering methods have only begun to be developed. In perfecting control procedure as the result of practical experience and in improving the machines for engineering methods, clearing, draining, spraying and dusting to operate more rapidly and cheaply and enable larger areas to be protected, the engineer has a large opportunity to advance the wellbeing of the community.

A Local Responsibility

THE slum-clearance housing problem is gradually being pushed out of Washington and back onto the states and local communities. This may or may not be a good thing for slum-clearance housing, but it is nevertheless fundamentally right and wholly consistent with the program that the PWA has professed to be following.

The latest development occurred last week when the federal government dropped its Supreme Court suits to establish its right to condemn land for PWA housing. It was pointed out by the Department of Justice that nothing would be gained by continuing the litigation, since land for all of the 49 projects in the program has been obtained. This program, it will be remembered, has always been held to be a "demonstration" program only, to show cities what can be done. Whether the federal government can condemn land for housing is therefore unimportant since it has no further purpose in acquiring housing sites. Dropping of the suits is also consistent with the federal government's favorable attitude toward Senator Wagner's proposed housing legislation, designed to furnish federal subsidy to municipal housing authorities that would acquire sites and erect low-cost housing.

Acknowledgment that low-cost housing is a local matter does not, however, assure any low-cost housing. Even a generous federal subsidy will not guarantee the abolition of the slums. The attitude of the cities themselves toward the problem is still an unknown quantity. First they must decide whether they favor public housing as a policy, a decision that will not be made quickly—mainly because public housing is wholly foreign to past experience in this country. At the same time they will have before them the demonstrated inability of private business to cope with slum-clearance housing, the shameful procrastination of slum-building owners to provide even a minimum of fire safety or sanitation, and their disposition to fight any attempt to bring about improved conditions, as is now being done in New York. The problem of low-cost housing and slum clearance is, at any rate, now on the municipal doorstep, and soon it will be apparent whether any progress is in prospect or whether the sore will be allowed to fester further.

CURRENT NEWS

Congress Considers Highway Bill

Expenditures for secondary and feeder roads as well as for grade crossing elimination in Hayden-Cartwright Bill

AUTHORIZING expenditure for federal-aid highway construction of $125,000,000 in each of the fiscal years 1938 and 1939, the Hayden-Cartwright Bill supplements an obligation of a like amount for the fiscal year of 1937 carried by the Department of Agriculture appropriation bill. Besides continuing regular federal-aid, the bill covers all road building in national forests, parks and Indian reservations by amounts similar to those passed by the last Congress.

A new feature authorizes expenditure of $25,000,000 in each fiscal year on secondary and feeder roads including farm to market roads, R.F.D. mail roads, and public school bus routes. These sums are to be expended under the provisions of the Federal Highway Act and must be matched by the states. This carries out the proposal of the American Association of State Highway officials at its December meeting that broadening the base for federal cooperation with the states in road building is desirable.

Crossing eliminations

In addition to the highway authorization, the bill includes authorization of $50,000,000 in each fiscal year for railroad crossing elimination. This sum does not have to be matched but will be expended under the Federal Highway Act and not under present emergency regulations.

The bill provides that when a sum has been authorized for a certain fiscal year it must be apportioned on or before January 1 preceding that fiscal year and state highway departments may immediately submit projects to the Bureau of Public Roads for approval.

Use is authorized of not more than 1½ per cent of any year's apportionment for surveys, plans, engineering and economic investigation of projects for future construction. Hearings before both the House and the Senate committee began on March 11 and favorable action is expected soon.

Wage Increase Demand Stops Cleveland Housing Work

Efforts are being made to have the National Labor Board of Review recommend that contractors be granted additional funds to provide for a wage increase so as to allow resumption of the three Cleveland housing projects that have been stopped since March 1 when labor employed on these projects asked for an increase of $1 per day in wages. As a result of a previous agreement, a number of the building trades in Cleveland have been granted a dollar a day increase after March 1. It was held by the building trades council of Cleveland that the contractors on the low-rent clearance projects did not recognize the new rate, and letters have been sent asking the labor review board at Washington to consider the situation and to recommend that the contractors be granted an increase equal to the amount of wage increases under the new rate.

The Cedar-Central project, providing 654 family units in 3-story walk-up apartments and the Outhwaite project providing 885 units in 2- and 3-story apartments and row houses, are being built by the George A. Fuller Co. and the West Side project, providing 635 units in 3-story apartments and 2-story row houses, is being built by the Madsen Construction Co.

Seek to Block PWA Funds For Transmission Line

Suit has been entered by the Tennessee Public Service Co. in the District of Columbia Supreme Court seeking to block a PWA loan and grant of $2,600,000 to the city of Knoxville for the construction of an electric distribution system and a transmission line to connect with the TVA system. Pending trial, a temporary restraining order has been issued by Justice Letts.

The same plaintiff has a suit pending against the city in the Supreme Court of Tennessee, which has been awaiting decision since Oct., 1935.

Mississippi Flood Plan Reported Favorably

A bill authorizing $272,000,000 to complete the flood control plan on the lower Mississippi River has been reported favorably by the Commerce Committee of the Senate. The bill proposes to put into effect the revisions recommended by Major Gen. Edward M. Markham, the Chief of Engineers, with the exception of that dealing with compensation. Under this bill construction of the Eudora floodway, from the Mississippi River at Eudora to the Red River backwater, would be mandatory, compensation to be adjusted as in the existing law. The Secretary of War and the Chief of Engineers favor the use of assessed values as a yardstick for the payment of flowage damages. The committee felt that the just-compensation method is preferable. Gen. Markham told the committee that this would commit the United States to "immeasurable responsibility."

The only other feature of the bill opposed by the engineers is the mandatory construction of the riverside reservoir on the White River.

Senator Vandenberg, of Michigan, opposed the bill and introduced a measure drafted by the Chief of Engineers which omits the White River project and would allow payment for flowage rights to be measured by assessed values. Early action on flood control legislation by the Senate is expected.

Housing Site Cases Withdrawn

Suits before the Supreme Court to determine the right of the government to condemn land for housing dismissed.

Washington Correspondence

SUITS to determine the right of the federal government to condemn land for housing purposes, which were to be heard by the Supreme Court on March 6, were dismissed on March 5 at the request of the Department of Justice. The suits, had to do specifically with sites in Louisville, Ky., and Detroit, Mich. Dismissal of the suits will leave undecided, for the time being at least, the question of whether the federal government has the power to condemn land for slum clearance and low-cost housing.

The Department of Justice states that the case has dragged on so long that the PWA has no funds available to carry through at Louisville. Available funds have gone to projects where opposition was less strenuous and thus it is held that there is no use in trying the case which, at its best, could result only in a useless victory. This attitude becomes more logical in view of the general expectation that the next federal housing program will function through local housing authorities, rather than as a federal activity. There are already 22 local authorities cooperating with PWA's present program, and the purchase of the needed land through them would be much less open to challenge.

Critics of the program hold that the suits were withdrawn because the government feared that the decision would go against it. The entire PWA program is based on the general welfare clause of the Constitution and this basis proved rather weak in the recent AAA decision. An adverse decision in the housing suit would render suspect not only the housing division but also all other PWA activities, including the power program.

The Buzzards Roost case, which is concerned with the government's power to grant funds for construction of power plants, is to be heard soon by the Supreme Court. As this case was recently decided in favor of the government by the Court of Appeals at Charlotte, N. C., it seemed better to rest the test of the constitutionality of the PWA on this case. The Louisville suit went against the government in the Court of Appeals at Cincinnati which held that the exercise of eminent domain by the government is well established only when exercised in taking lands for public use (*ENR*, July 18, 1935, p. 98).

Horicon Marsh Cannot Be Flooded, Court Rules

The age-old conflict in southwestern Wisconsin between drainage advocates and conservationists over the drainage of the 30,000-acre Horicon marsh has reached

another milestone. On March 3 the state supreme court ruled that the marsh, which has been drained since 1908, cannot now be flooded and thereby drown out farm lands without compensating the 200 land owners. No money is available to the Conservation Commission for compensation (estimated to be in excess of $250,000), and the gates in the dam were therefore immediately ordered opened. In 1927 the state legislature passed laws appropriating $10,000 for a dam and instructing the Conservation Commission to raise the water level to that existing prior to 1908, when the supreme court of that day refused to permit the formation of a drainage district, although private owners dug ditches anyway. The present decision holds that the marsh land has been drained so long that its condition must be treated as a natural one.

Green Mountain Highway Rejected by Voters

By a 4 to 3 majority, about 71,000 Vermont voters turned down the proposed $18,000,000, 260-mile parkway through the Green Mountains in a referendum on March 3. The project was proposed by the National Park Service as a part of a chain of Eastern scenic attractions, eventually to tie into the lower Appalachian area. The immediate issue was whether Vermont should supply land for the Park Service to build the roadway, such land requiring a purchase bond issue of $500,000. Five of the fourteen counties favored the project.

Eleventh Cut-off Opened For Mississippi River

Rodney Cut-off, the eleventh of the Mississippi River cut-offs, was opened on Feb. 29, and on March 2 it was reported as discharging 26,000 sec.-ft., or about 5 per cent of the main river flow.

The cut-off was begun at Rodney Point, below St. Joseph, La., during the latter part of the 1935 high water period. A pilot dredge cut was started at this time and work was suspended during the 1935 low water and resumed for the 1936 high water (*ENR*, Feb. 20, 1936, p. 269).

Large Highway Allotment Approved for Mississippi

A loan and grant of $33,500,000 to the state of Mississippi for improving main highways has been approved by PWA Administrator Ickes. Application for the project was made to PWA last year and a tentative approval was given by earmarking funds. Congressional action to make federal-aid highways eligible as PWA projects was necessary, as was action by the state legislature.

The state legislature passed an act providing that 1¼ cents of each 3½ cents of the gasoline tax should go to the state highway fund to be used to pay interest on the new bond issue. The gas tax of 6 cents per gallon was not increased when the allocation was made by the legislature. The bond issue of $18,500,000 approved by the legislature is to be used as security for the loan portion of the allotment.

PWA Reports to Senate on Projects

Ickes' statement in response to Hayden Resolution shows almost 7,000 permanent construction projects which have been approved, but for which funds are not available; Norris resolution brings report on power projects

PROJECT applications totaling $3,100,000,000 were reported to the Senate by the PWA in response to the Hayden resolution, which requested Administrator Ickes to furnish a list of non-federal projects pending before PWA which have been approved by the Administrator, but for which allocations have not been made because of lack of funds. A second list of projects pending and which have not been finally disapproved by the Administrator was also asked.

The Administrator's report pointed out that of nearly 7,000 projects which have been submitted to Washington from state offices with tentative approval, 1,476 have been given final approval by the three PWA examining divisions—legal, finance and engineering. PWA states that work on these projects could get under way at once if funds were available. The projects listed call for loans of $83,000,000 and grants of $143,900,000, making possible construction, totaling $349,000,000. Other pending projects are in the course of examination. The report noted that all of the 6,801 applications, for which the applicants are ready to contribute about $1,952,000,000, originated with local and state governments, the majority of which applied for grants only. Inasmuch as this differs from previous applications which sought both loans and grants, it is held to indicate improved financing through private investment channels.

Profits from loans

The sums applied for in loans would be repaid to the government with interest at 4 per cent. Municipal and other securities acquired by PWA are sold to the public through the Reconstruction Finance Corp. and the proceeds revert to the PWA revolving fund to be used in the construction of other public works. Premiums realized from past operations already exceed $5,000,000.

Further reports by PWA indicate that 16,233 projects, totaling more than $1,000,000,000, have been completed and are in use. Projects now under construction, numbering 4,419, will require ultimately nearly $2,200,000,000. Expenditures of $1,985,845,000 have been made on the completed projects and those still under construction. More than 60 per cent of these expenditures has gone for materials, and wages paid to men employed on construction sites totalled $639,000,000.

Of the projects completed, 13,770 projects have been finished by departments of the federal government while 2,463 projects have been finished by local communities. Projects now under construction include many jobs which have been under way for a year or more and will continue. In this group are such projects as the Triborough Bridge and Midtown Hudson tunnel in New York City, the Chicago and Minneapolis sewage disposal plants, the Fort Peck and Grand Coulee dams.

Municipal power projects

In response to the resolution proposed by Senator Norris, PWA further reported 269 electric power projects involving allotments of $76,091,446. Gas projects number 29 and involve allotments of over $2,000,000. The report points out that 60 of the electric power projects are completed, 81 under construction and 59 in litigation. Eight of the gas projects are completed, and none is in litigation.

In discussing the projects in litigation, the report points out that most of the suits have been brought by private power companies attacking the constitutionality of the federal statutes authorizing the allotments. Restraining orders have been issued by the federal courts prohibiting PWA from making payments to applicants in 36 different cases. Local electric power project allotments have been made in 43 states and in Alaska.

Silicosis Develops Slowly, Health Authorities Declare

Experience in the South African mines has demonstrated that minimum exposure of 2½ years and an average exposure of 13 years to silica dust is required in the development of silicosis to the stage where it can be diagnosed as such, declared Dr. R. R. Sayres, U. S. Public Health Service, at the occupational disease forum held in connection with the Seventh Greater New York Safety Conference last week. He said that there were a few isolated cases of silicosis resulting from exposure of 18 months, but that these cases were rare. In answer to a question from the floor as to the effectiveness in wet drilling in the prevention of silicosis, Dr. Sayres said that in South Africa the disease had been placed under control, but was not entirely prevented, by wet drilling methods. A report on a wet drilling test in New York showing dangerously high concentrations of dust in the breathing zone of the drill runner was read from the floor.

In a session on occupational diseases, Dr. J. A. Lanza, of the Metropolitan Insurance Co., also declared that silicosis developed slowly. He pointed out that the development of the disease was proportional to the concentration of silica in the dust, the amount of dust and the continuity of exposure. If these factors were kept in mind, he said, there would be none of the current hysteria over the silicosis problem. Dr. Lanza, in discussing diagnosis of the disease, declared that the patient's full occupational history must be known. "It is not what he has done in the past two months or two years, it is what he has done in the last ten, fifteen and twenty years that counts." He urged pre-employment and periodical examinations of employees. Silicosis in itself is not usually a disabling disease, he said, and silicotics are well able to work at tasks where they are not subject to further silica dust exposure. Compensation of occupational diseases is going to be general in the near future, Dr. Lanza declared.

Dr. L. U. Gardner, of Saranac Laboratories, discussed the pathology of silicosis. Silica is an acute poison to human and animal systems, he declared, but just why,

no one knows at present. Silicosis is a fibrosis of the lung tissue resulting from the presence of microscopic silica particles within the lung. The theory that the lung liquids dissolve the silica and set up a chemical reaction that causes fibrosis is not accepted by Dr. Gardner, who pointed out the difficulty of dissolving silica in the test tube. Tests made on animals show that only silica dust produces the peculiar lung fibrosis; other dusts are apparently not harmful. In the development of the disease in the lungs, the fibrosis of tissue continues in nodule form as long as fresh particles of silica are present. Within two or three years after cessation to exposure, Dr. Gardner said, the nodules cease to grow and the course of the disease is arrested. He declared that the ample reserve capacity of the human lungs precludes disablement except in the last stages of silicosis.

Montreal Marquee Collapses Injuring Two Persons

The metal canopy of the St. Denis Theater in Montreal suddenly collapsed on Feb. 27, injuring two pedestrians, one of them seriously. The marquee, which was a cantilevered structure supported also by heavy chains, appears to have been overloaded with wet snow, according to reports.

This is the second structure in Montreal which is reported to have failed during the past few weeks because of heavy snow loading. The other structure was a newly completed armory roof, failure of which was reported in *ENR*, Feb. 27. At the time of that report it was stated that the armory, for the Royal Canadian Hussars, was being constructed by the Department of Public Works for which T. W. Fuller was chief architect. Recent dispatches show this to be an error as the construction is not being done by the Department of Public Works, but by the Department of National Defense, with Messrs. Ross & Macdonald, architects, in charge of design and construction.

Pennsylvania College to Conduct Housing Conference

The increasing interest in low cost effective housing for urban and rural communities has caused Pennsylvania State College to arrange a conference on low cost housing, to be held April 16-17, as a complement to the usual industrial conference held in May. The program has been so arranged as to review various factors which may bring about a reduction in price of the completed home. Among papers that will be presented are those by H. S. Buttenheim, editor, *American City*, on taxation as a factor in housing for low income groups; interrelation of industrial decentralization and housing, by N. H. Engle, assistant director, Department of Commerce; an analysis of the housing problem for low income groups, by Arthur C. Holden, consulting architect, New York City, and recent trends in American housing, by Dr. Edith E. Wood. Ernest M. Fisher, director, Division of Economics and Statistics, FHA, will present a paper on the rôle of government in housing. The college is arranging a housing exhibition to coincide with the conference.

Suits Started to Halt Texas River Work

Injunctions sought to restrain WPA and local authorities from construction of flood control and power projects in Texas

ACTION to block the Brazos and Lower Colorado River projects has been brought in the Supreme Court of the District of Columbia by seven utility companies. Complainants are Community Public Service Co., Dallas Power & Light Co., Gulf States Utilities Co., Houston Lighting & Power Co., Texas Electric Service Co., Texas Power & Light Co. and Texas Utilities Co. Asserting that construction of the two projects would damage 100,000 holders of public utility securities in Texas, complainants charge projects would operate primarily as producers of power and that any flood control or aid to irrigation which may result will be purely accidental and incidental, and that as a matter of fact the projects would be deterimental to, rather than in aid of, flood control and irrigation.

Ten-day restraining orders were granted on March 6 on motion of the complainants. Later a hearing will be held on granting a temporary injunction.

Scope of work

The work on the Brazos River is under control of a local authority, the Brazos River Conservation and Reclamation District, created by the Texas legislature. The general plan comprises thirteen dams and reservoirs along the river for flood control, irrigation and power production. On Oct. 4, 1935 WPA granted a maximum of $30,092,345 to the project, subject to the action of the state WPA director. This grant is subject to change without notice by the state director who has the power to shift funds from one project to another. WPA headquarters in Washington believe that at least some of the money has been made available and that work has started on most of the dams.

Projects on the Lower Colorado, which were originated by private individuals have been taken over by the Lower Colorado River Authority, a state body, which has secured a loan and grant of $15,000,000 from PWA and an additional $5,000,000 which PWA allotted to the Reclamation Bureau for use on the irrigation parts of the work. The project involves the completion of the Hamilton Dam near Bluffton, Tex., and the construction of a unified system of new dams and reservoirs providing flood control, water storage and power. Water storage will irrigate 120,000 acres of rice land 90 mi. downstream from Austin, Tex.

Extending in a band from 50 to 100 mi. wide from the Gulf Coast, northwest of Houston, to the semi-arid Texas Panhandle, the Brazos River watershed comprises 44,600 sq.mi. and includes a rich agricultural region and extensive natural gas and oil fields. The assessed valuation is $750,000,000 and the population is 1,500,000 people. One-third of the area is cropped, producing in 1929 $142,000,000 worth of produce and $29,000,000 worth of minerals.

During investigation by the state and federal governments for 30 years more than $315,000 has been spent to determine the economic feasibility of the Brazos project which provides, first for the systematic development of the water resources of the watershed for the purposes of sanitation, industrial uses, recreation, domestic consumption, and for the removal of the recurring menaces of great floods. All plans since 1926 have centered on treating the project as a whole and were worked out on this basis to be financed on a self-liquidating basis prior to the advent of federal subsidies.

Conditions on the Brazos and its tributaries have been altered little by man-made structures. The few locks and dams built by the War Department have been sold and are not in use. The flow alternates between periods of drought and devastating floods, either extreme being harmful. Flood losses in 16 years are estimated at $20,000,000 and 346 lives. For the nine months ending Feb. 28, 1935, $3,317,000 was spent on drought relief.

Methods of regulation

Methods proposed for river regulation include reservoirs to equalize the flow, artificially fixed channels to prevent meandering and caving banks, and levees to protect low lands. Storage of flood waters to reduce floods and relieve drought is considered the first necessity. Eleven major and two auxiliary storage dams controlling three-quarters of the watershed area will cost $32,000,000. Liquidation of this cost is planned by the sale of hydroelectric power aided for the first twenty years by an annual tax diversion of $309,000 allowed by the state legislature.

The effective storage capacity is based on a maximum draft of 30 per cent of available head at the reservoir, the power to be offered for sale to distributing companies at low rates. Five mills per kw.-hr. has been mentioned and no retailing is contemplated. In addition to this effective capacity additional emergency storage is available in the 15-ft. freeboard provided in all dams involving earth structures.

In 1929 the legislature created the Brazos River Conservation and Reclamation District. Engineering studies have been handled by the State Board of Water Engineers who in turn have engaged other specialists.

Floods throughout the area are disastrous. The worst was in 1921 doing $10,000,000 property damage and claiming 224 lives. Seven levee districts have constructed about 80 miles of levees to protect 82,000 acres. Many have proved indequate and many levee districts are in default on payments of bond service.

One of the first dams proposed is Possum Kingdom which as planned has a reinforced concrete spillway surmounted by eight 12-ft. crest gates each 67½ ft. long placed on a multiple arch structure. The power house is located alongside the spillway and has intake with trash rack and gate tower in a bulkhead adjoining the spillway. The initial installation provides for two 9,500 kw. single vertical units.

Rural Electrification Bill Passed by Senate

The Rural Electrification Bill sponsored by Senator Norris, providing for the expenditure of $4,020,000 in loans throughout the ten-year program period, was passed by the Senate on March 7.

The bill provides for the establishment of a permanent rural electrification adminis-

tration empowered to lend money to states and municipalities. Cooperative, non-profit or limited-dividend corporations or associations set up to finance electrical generation and transmission systems in rural areas not, at the present time, served by power plants, would also be eligible for loans under the proposed plan. These organizations could in turn lend money to individuals for wiring and electrical equipment.

The measure authorizes the Reconstruction Finance Corporation to furnish $50,000,000 for each of the first two years of operation. For the following eight years annual appropriations of $40,000,000 would be authorized. Under the terms of the bill the measure is to go into effect on July 1.

Senator Norris' original bill called for the use of $1,000,000,000 but was later revised. An amendment to the bill provides that plants built with the aid of these funds cannot be sold or transferred to a private concern until all loans, including interest and charges, have been repaid, and then only with the approval of the administrator. Loans made by the administration would bear 3 per cent interest.

The rural electrification administration is now functioning as an emergency bureau under Morris L. Cooke. Under the terms of the bill the personnel of this organization would be transferred to the permanent administration.

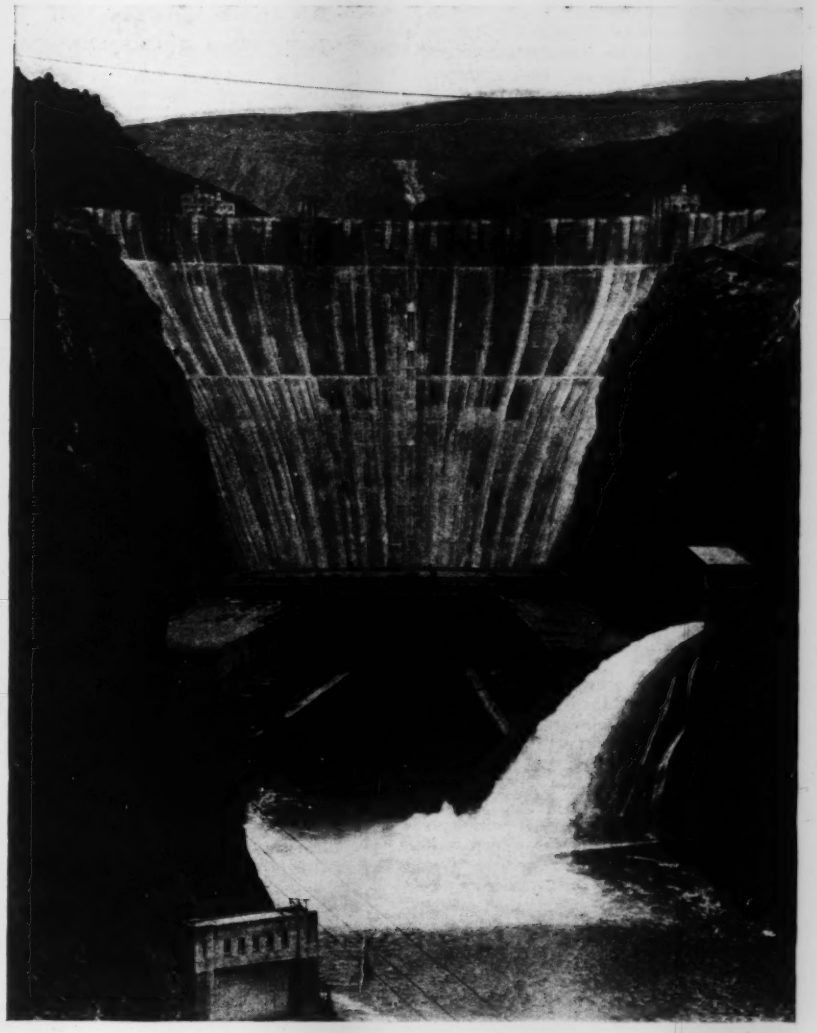
Engineering Registration Begins in Maine

The first of March marked the entry of the State of Maine into the increasing group of states regulating the practice of professional engineering. On that date about 160 engineers received their certificates of registration as provided for in the act passed in 1935.

The movement that resulted in the passage of the registration was inaugurated in the fall of 1934 when the Maine Association of Engineers sponsored a meeting in Portland to which all the engineers in the state were invited for discussion of the question of registration in the state. The speaker of the evening was D. B. Steinman, president of the National Society of Professional Engineers. A committee was selected at that meeting to draft a law and present it at a later meeting. The law was presented at a meeting held early in 1935 and it was voted to introduce the law as a bill to be passed at the current session of the legislature. The bill was approved in April.

The new law follows very closely the so called model law as approved by the major engineering societies. As originally drawn it provided for the registration of both engineers and land surveyors; however, due to opposition the part covering the surveyors was dropped.

The law sets up a registration board of five professional engineers to administer its provisions. To this board the governor has appointed: Lucius D. Barrows, chief engineer of the state highway department, chairman; Paul Cloke, dean of the College of Technology of the University of Maine; Frank H. Mason, chief engineer of the New England Public Service Co.; Paul Bean, engineer of the Union Water Power Co.; and Lewis D. Nisbet of the firm of Nisbet & Griffin, of Portland.



Outlet Valve at Boulder Dam Tested

Testing of the outlet valves at Boulder Dam has begun. This picture shows one of the six valves in the valve house on the Arizona side discharging 1,000-sec.-ft. into the canyon. The outlet works consist of six 84-in. needle valves in each of the canyon-wall outlet buildings, serving the upper penstock lines, and six 72-in. needle valves in the plugs of the inner tunnels, serving the lower penstock lines. The maximum capacities are 4,000 sec.-ft. The canyon wall valves work under a head ranging from 160 to 320 ft.

According to C. C. Elder, hydrographic engineer for the Metropolitan Water District of Southern California, Mead Lake, behind Boulder Dam, already constitutes the world's largest artificial lake although it is now less than 15 per cent of its ultimate size. Snowfall data from Utah, Wyoming and Colorado indicate that the flow of water into the reservoir will be normal or above normal, and if this condition holds the reservoir will be half full by Aug. 1. On Feb. 29 the reservoir contained 3,794,000 acre-ft. of water, extending above Black Canyon for almost 90 miles. When full capacity is reached the reservoir will impound 30,500,000 acre-ft. of water and will cover an area of 227 sq.mi. Water in the lake will extend 115 mi. from the dam, varying in width from a few hundred feet to a maximum of 8 mi.

Funds Made Available for East River Tunnel

Funds for the construction of a tunnel under the East River from 38th St., Manhattan, to Borden Ave., Queens, were formally accepted by the New York City Tunnel Authority on Jan. 7. A sum of $58,365,000 has been made available through a PWA grant of $11,235,000 and a loan of $47,130,000 secured by bonds of the Authority which are to be retired from tunnel tolls.

The government advanced $220,000 for a three months budget of the Authority to cover additional borings and construction shafts as well as plans and specifications.

Members of the New York City Tunnel Authority are William H. Friedman, Albert B. Johnson and Alfred B. Jones. Ole Singstad, consulting engineer to the Port of New York Authority, has been made chief engineer.

Reclamation and Power Plans in New Congressional Bills

A bill to relieve the Orland Water Users' Association of all responsibility for construction and operating costs of the Orland reclamation project has been in-

troduced by Sen. Hiram Johnson of California. A period of 35 years for the payment of the cost of the Stoney Gorge reservoir also was proposed. Sen. Sheppard, of Texas, has introduced in the Senate the measure already introduced in the House, proposing a survey by the Corps of Engineers of the Sabine-Neches River basin for flood control and electric power development. The President on March 9 signed the bill providing for flood control work on the San Gabriel and Los Angeles Rivers and their tributaries. The bill providing for flood control on creeks in Ulster, Greene, Schoharie and Sullivan counties, New York, was signed by President Roosevelt March 9. Rep. Ellenbogen, of Penn., has introduced a bill creating a rent commission for the District of Columbia with broad powers over rentals and housing conditions. Sen. Bone, of Washington, has introduced a bill giving municipalities and public corporations various priorities in the use of power to be generated at the Bonneville project. A definite percentage of the power, to be fixed later, is to be reserved for municipalities and publicly-owned corporations.

Rensselaer Institute Offers Four-Year Scholarships

The board of trustees of the Rensselaer Polytechnic Institute, Troy, New York, is offering a scholarship for a four-year engineering course to be given to some student in each of the four following districts: Chicago, New York, Connecticut and Rochester. This scholarship will cover the tuition fee. It will be renewed each year provided the student maintains high standing in his work.

In determining the awards the committee will take into consideration the students' scholastic standing, his need for help and his competency to pay expenses other than tuition. Character and leadership qualities will also be considered. Names of all candidates must be in the hands of the committee not later than April 1.

Ice and Early Floods Damage Bridges

High water following the melting of the heavy snow and ice blanket of the winter caused damage to bridges at a number of places and a considerable amount of local flooding and damage to river banks. Reports to *Engineering News-Record* indicate, however, that the retardation of melting by cold weather removed the earlier threat of exceptionally severe floods. Apprehension is still felt in some localities where a considerable depth of snow cover remains or where the breakup of ice is not yet complete.

Ice pressure weakened the cylinder pier supports of the Highland Park bridge over the Allegheny River at Pittsburgh; details are given in an item published on this page. A highway bridge over the Kansas River at Eudora, Kansas, was badly wrecked by ice, which overturned one cylinder pier in the main channel, according to E. E. Trueblood, county engineer at Lawrence; one 150-ft. and one 65-ft. steel span were carried into the river, with damage of about $25,000. At Amity Hall, Pa., on the Susquehanna River, it was necessary to blast away part of the highway along the shore to open a channel for water backed up by ice.

SOCIETY CALENDAR

MIDWEST POWER ENGINEERING CONFERENCE, Chicago, Ill., April 20-24.

AMERICAN WATER WORKS ASSOCIATION, annual meeting, Los Angeles, Calif., June 8-12.

AMERICAN SOCIETY FOR TESTING MATERIALS, annual meeting, Atlantic City, N. J., June 29 to July 3.

NEW JERSEY STATE PLANNING CONFERENCE, New Brunswick, March 18.

NEW JERSEY SEWAGE WORKS ASSOCIATION, annual meeting, Trenton, March 19-20.

KENTUCKY-TENNESSEE SECTION, AMERICAN WATER WORKS ASSOCIATION, Lexington, Ky., March 23-25.

NEW YORK SECTION AMERICAN WATER WORKS ASSOCIATION, Oswego, N. Y., March 26-27.

FLORIDA SECTION, AMERICAN WATER WORKS ASSOCIATION, annual meeting, Tampa, March 31-April 1.

INDIANA SECTION, AMERICAN WATER WORKS ASSOCIATION, annual convention, Lafayette, Ind., April 7-9.

ILLINOIS SECTION, AMERICAN WATER WORKS ASSOCIATION, annual convention, Evanston, Ill., April 10-11.

Ice Damage Requires Closing Pittsburgh Bridge to Traffic

The Highland Park Bridge over the Allegheny River in Pittsburgh, Pa., was closed to traffic last week in order to repair the circular steel plate caissons that support the viaduct section and which received a severe battering from the heavy ice floes of late February. Investigation of the caissons which are 4 ft. in diameter and filled with gravel showed that the top 2 ft. of one caisson was practically empty with the concrete cap supported only by rivet heads and by friction. Other caissons were similarly affected and it will be necessary to solidify the gravel and fill the voids, according to John F. Laboon, director, county department of works, Allegheny County. The caissons extend above the river bed about 20 ft.

The bridge, built nearly 35 years ago, had previously been damaged under similar conditions, but was repaired last year by strengthening the lateral members above the caissons. No damage to these members occurred during the recent ice floes.

A new bridge for the Highland Park location has been planned for several years and designs, as now completed, contemplate a steel cantilever structure. The project is one of those included in the program of the Allegheny County Authority for which final financing has not yet been arranged.

Waterworks Convention Group Offers Conducted Tour

A personally conducted tour for those who attend the Los Angeles convention of the American Water Works Association, June 8-12, has been arranged by the transportation committee. For those who wish to go on the personally conducted tour, a special train will leave New York May 29 and arrive in Los Angeles on June 7. The train will pick up passengers at points between New York and Kansas City and will make pleasure stops at Colorado Springs, Salt Lake City, Bryce Canyon, Zion National Park, Boulder Dam. On the return trip stops will be made at Del Monte, San Francisco, Portland, Seattle, Victoria, Vancouver, Emerald Lake, Yoho Valley, Lake Louise and Banff; thence the route will through Chicago and Pittsburgh to N York.

All-expense tours, though not personal conducted, provide three alternative retu routes, either through Glacier Natio Park, Yellowstone National Park, or Prin Rupert and Jasper Park. A number other transportation plans are available persons attending the convention.

New York State Engineers Discuss Pending Legislation

Legislation being considered by the Ne York state legislature was the princip subject for discussion before the midwint meeting of the New York State Socie of Professional Engineers, held in Alban March 7. Other subjects were eligibili rules under civil service, dues and a pr posed change in society headquarters. Th society officers were urged to move th headquarters from New York to Alban where the headquarter's staff can keep i close touch with legislation to see tha nothing detrimental to the interests of en gineers gets into laws unnoticed.

State Senator Thomas C. Desmond, a member of the society, spoke on county government reform, a subject in which h has been active for several years past, and urged that the county chapters take an interest in the bill he has submitted to the legislature providing for such reform.

Reduction of the society's dues was urged, the total for both state and national society now being $10 per year.

Personals

R. E. STALLINGS, for many years assistant city engineer of Tucson, Ariz., has returned to this work after an absence of two years. For the past two years he has been in the government service as supervisor of road work on Papago Indian Reservation west of Tucson.

LAURENT LOWENBERG, consulting engineer, has accepted an appointment from City Manager C. A. Dykstra to direct a public transportation survey of Cincinnati, including a study of possible use of the rapid transit subway. The city has received a WPA allotment of $28,000 for the survey.

JAMES ROBERTSON was elected chairman of the Vancouver, B. C., branch of the Engineering Institute of Canada at the annual general meeting recently.

GEORGE W. CRAIG, president of the consulting firm of Craig, Skidmore and O'Brien, Inc., has been appointed commissioner of public works, Evanston, Ill., following the resignation of ARTHUR W. HANDFORD. Mr. Craig was recently western representative of the Asphalt Institute and for ten-year terms was city engineer of Omaha, Neb., and Calgary, Alberta.

M. W. TORKELSON, regional planning director, Wisconsin State Highway Commission, has been made acting state WPA director succeeding Gen. Ralph M. Immel, who resigned because of the pressure of other official duties as adjutant general.

FREDERICK A. GABY, former president of

the Engineering Institute of Canada, is retiring from the position of assistant to the president of the Canadian Pacific Ry., to become executive vice-president and director of the British American Oil Co.

H. J. CURTIS has been appointed deputy city engineer at Niagara Falls, N. Y.

Obituary

CHARLES B. JACKSON, formerly Fresno manager for the California Water Service Company, died recently at his home in San Mateo at the age of 60. He was prominent in many fields of engineering activity, having been associated with the San Joaquin Light and Power Co., local traction interests, the Fresno City Water Company, and having served for a term as president of the California section of the American Waterworks Association.

JOSEPH P. MCNALLY, sales engineer for the past several years for Iron & Steel Products, Inc., Chicago dealers in railway equipment, died as the result of a heart attack at his home, Chicago, on Feb. 29. He was 68 years of age.

JAMES AHEARN, a civil engineer in the Department of Buildings, Brooklyn, N. Y., died suddenly in that city last week. He was 69 years old and was to have retired April 1 after 37 years of service.

R. DWIGHT WATSON, engineer, formerly of Tiffin, Ohio, died in Oakland, Calif., March 5. He was 47 years of age.

WILLIAM E. HYNDMAN, district engineer of the Department of Public Works, Canada, for the province of Prince Edward Island, died at Charlottetown, P.E.I., on March 1 at the age of 61. A native of the Island Province, Mr. Hyndman studied at McGill University and had engineering experience in British Columbia. He had been with the Public Works Department for 40 years.

CONSTRUCTION STATISTICS FOR THE WEEK

ENGINEERING construction awards total $48,656,000 for the week. Private awards make up $23,423,000 of this total, public awards, $25,233,000 of which federal is $3,916,000 and state and municipal, $21,317,000. Corresponding volume a year ago is: total, $27,721,000; private, $4,963,000; public, $22,758,000 of which federal is $5,933,000 and state and municipal, $16,825,000.

Industrial and commercial buildings account in part for the gain over last week with highways and earthwork and waterways also contributing a higher volume. The classified distribution includes: commercial buildings, $4,131,000; industrial buildings, $10,152,000; public buildings, $6,654,000; streets and roads, $7,792,000; bridges, $3,321,000; waterworks, $1,482,000; sewerage, $2,642,000; earthwork and drainage, $1,983,000; unclassified, $10,499,000.

The larger awards for the week include factory for Viscose Co., Meadville, Pa., $1,000,000; paper mill for Crossett Lumber Co., Crossett, Ark., $4,000,000; wire mill for Republic Steel Co., South Chicago, Ill. (direct labor), $1,000,000; paper plant for Champion Paper Co., Houston, Tex., $3,000,000; nurses home for St. Lukes Hospital, New York, N. Y., $1,200,000; parcel post building, Dallas, Tex., $592,000; highways, by Iowa, $505,000; by North Carolina, $632,000; by California, $540,000; by Montana, $1,433,000; by Tennessee $650,000; bridges by Iowa State Highway Department, $476,000; Contracts 202-3-4-5, superstructure, abutments and approaches, Homestead High Level Bridge, Allegheny County Authority, Pittsburgh, Pa., $1,340,000; furnishing and laying pipe for conduit 2A from Howard Bend waterworks station to Stacy Park Reservoir, St. Louis, Mo., $695,000; Section 11, North Metropolitan Relief Sewer, Medford, Mass., $503,000; dredging, 4,335,000 cu.yd. San Diego Bay, San Diego, Calif., $561,000; improvements to electric distribution system, Public Service Gas and Electric Co., Newark, N. J., $2,000,000; storage yard and trackage in Roanoke, engine facilities and trackwork at New Buchanan Co. branch line, day labor and separate contracts, Norfolk & Western R.R., Virginia, $5,000,000; 20,000 tons rails, Chesapeake & Ohio R.R., Richmond, Va., $670,000.

CONTRACTS
(Thousands of Dollars)

	Weekly Average Mar. 1935	Prev. 4 Weeks	Week Mar. 12 1936
Federal Government	$3,373	$1,264	$3,916
State and Municipal	13,845	25,954	21,317
Total public	$17,218	$27,218	$25,233
Total private	5,521	9,853	23,423
Week's total	$22,739	$37,071	$48,656
Cumulative to date:			
1935...$266,873,000	1936...$535,526,000		

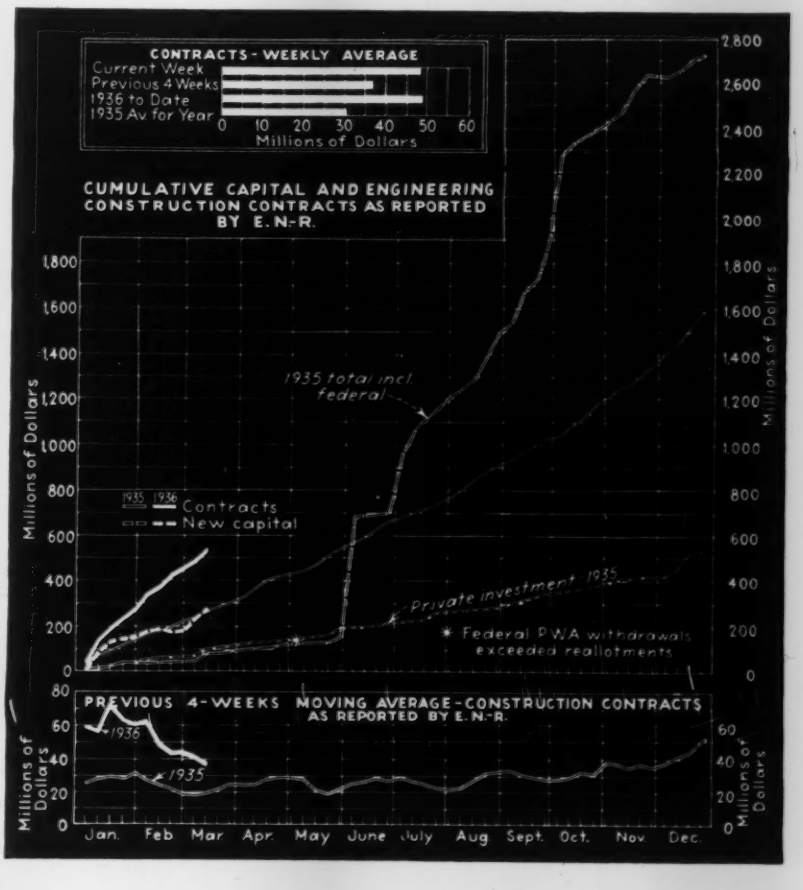
NEW PRODUCTIVE CAPITAL
(Thousands of Dollars)

1936	Week Mar. 12	Cumulative
State and municipal	$5,163	$120,475
PWA non-federal	33,410	61,859
RFC loans	....	25,000
Corporate issues	....	61,341
PWA loans	....	1,270
Total Non-Federal	$38,573	$269,945
Federal	500	4,771
Total new capital	$39,073	$274,716
Cumulative to date:		
1935...$81,295,000	1936...$274,716,000	

Note: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for federal construction, deficiency act funds. An arbitrary percentage (25%) of the WPA allotments and local contributions to WPA work is included to allow for the capital additions through the Works Progress Administration division of the new program.

INDEX NUMBER

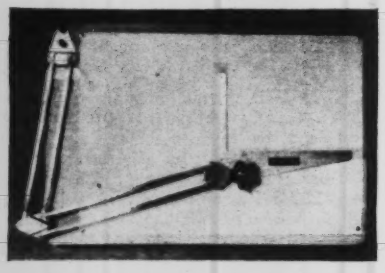
ENR Cost	1913 = 100	1926 = 100	ENR Volume	1913 = 100	1926 = 100
Mar., 1936	201.20	96.71	Feb., 1936	176	77
Feb., 1936	201.20	96.71	Jan., 1936	248	109
Mar., 1935	194.26	93.38	Feb., 1935	76	33
1935 (Av.)	195.22	93.84	1935 (Av.)	135	58
1934 (Av.)	198.10	95.23	1934 (Av.)	114	50
1933 (Av.)	170.18	81.80	1933 (Av.)	102	47


CONTRACTS - WEEKLY AVERAGE
Current Week
Previous 4 Weeks
1936 to Date
1935 Av for Year
0 10 20 30 40 50 60
Millions of Dollars
CUMULATIVE CAPITAL AND ENGINEERING CONSTRUCTION CONTRACTS AS REPORTED BY E.N-R.
Millions of Dollars
1935 total incl. federal
1935 1936 Contracts
New capital
Private investment 1935
* Federal P.W.A. withdrawals exceeded reallotments
PREVIOUS 4-WEEKS MOVING AVERAGE-CONSTRUCTION CONTRACTS AS REPORTED BY E.N-R.
1936
1935
Jan. Feb Mar Apr May June July Aug Sept. Oct. Nov Dec.

Construction Equipment and Materials

Drafting Instrument Designed For Accurate Work

A newly designed drafting machine, the Wrigraph Model E-272, has now been added to the line of machines manufactured by L. G. Wright, Inc., Cleveland, Ohio. The instrument, which is mounted on a 22x30-in. drafting board, is calibrated for accuracy



and is equipped with a vernier for indicating protractor reading to degrees. The protractor unit has a chuck plate to hold the drawing attachments in perfect alignment. The graduated L-square is made with transparent edges and riveted to a light-weight stiffener. The parallel mechanism is equipped with nickel-plated steel parts and solid phosphor bronze bearings. The machine can be furnished without the board, and by a special base plate can be easily fastened to any flat wood surface.

Vibrating Screens For Low Clearance

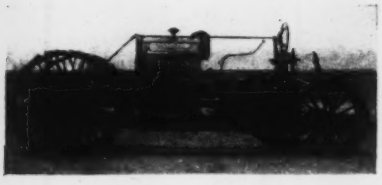
The low-head horizontal screens manufactured by the Allis-Chalmers Mfg. Co., Milwaukee, Wis., are suspended by cables and springs, and the mechanism imparts a straight line motion at a definite angle relative to the horizontal. This new line of screens was designed for installation where head room is at a premium. Forward and upward motion of the screen advances the material along the surface, segregating the finer particles on the bottom so that the undersized material is quickly and easily removed.

Electrode for Welding Bronze, Brass and Copper

A new phosphor bronze arc-welding electrode developed by the Lincoln Electric Co., Cleveland, Ohio, can be used to weld bronze, brass, copper and galvanized sheets satisfactorily. The Aerisweld, as the electrode is called, provides a homogenous deposit having the characteristics of true phosphor bronze with notably high tensile strength. It is a shielded arc electrode for use with a metallic arc. The electrode is used with positive polarity welding current, and preheating of the parts is unnecessary when welding any ferrous metal and the lighter grades of copper and bronze. Where heavy bronze or copper is to be welded, some preheating may be necessary. The Aerisweld electrode is made in $\frac{5}{32}$- and $\frac{3}{16}$-in. sizes, 14 in. long.

Form Trenches Graded By Power Machine

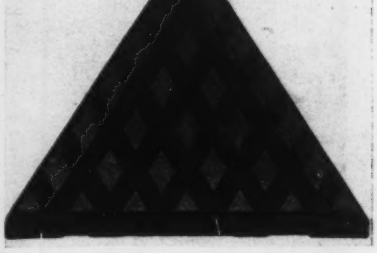
A machine which grades and compacts form trenches is now being produced by the R-B Equipment Manufacturing Co., Royal Oak, Mich. This new machine, the Form-Trench Grader, utilizes the same principle as the R-B finegrader. The cutting action is secured by means of a series of cutting teeth operating in an oscillating motion from a cam shaft. An elevator flight assembly removes excess soil completely off the grade, and a large wheel compacts the base of the form trench to provide a true foundation for the forms. All motive power is on the



front of the machine, which eliminates the need to true up the form trench after the machine has passed. The finished channel is 16 in. wide, which provides ample space for setting and lining up the forms. Adjusting the digging mechanism to compensate for changes in grade can be done quickly and accurately.

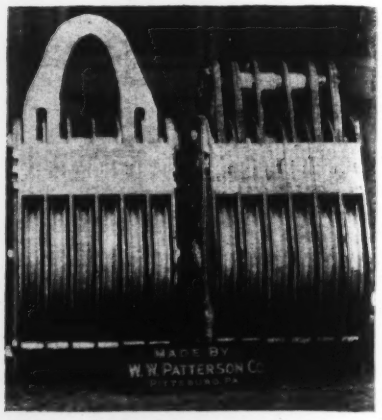
Triangular Paving Plates Give Structural Stability

With the letting of contracts totaling $100,000, the Interlake Iron Co., Toledo, Ohio, has begun work on its new plant for the production of iron paving plates. The iron plate is constructed in the form of a 10½-in. triangle and is 1⅜ in. in overall thick-



ness. Around the outer edge of the bottom of the plate is a flange about 1 in. deep and ¼ in. thick, with air space in the center for anchoring in a concrete base.

The iron paving tiles are made of varying strengths to meet different load conditions and are manufactured in two general classes: one for roadways and one for [in]dustrial flooring. The tiles are laid dire[ctly] on a rigid base of concrete or steel, and [the] joints are filled with asphalt or other pla[stic] material suitable for the application. [The] base is thus completely protected from m[oi]ture and the action of weak acids and grea[se]. Lugs provide for proper spacing and e[ase] of laying. The tiles are furnished in smo[oth] surfaced or anti-skid designs. The trian[gu]lar form, which was adopted to prov[ide] greater structural stability, is based on [the] same principle that leads to the use of [in]strument tripods.



TACKLE BLOCKS, manufactured by the W. W. Patterson Co., Pittsburgh Co., Pittsburgh, Pa., for use in the erection of 300,000 lb. fractionating column at Curacao, D.W.I., for N. Y. de Curaco-Asche Petroleum Industrie Mij. Photo shows two of the four blocks made for this purpose; each weighs 2,200 lb.

New Publications

NEVILLE TAR, The Neville Co., Pittsburgh, Pa. 6x9, 25 pages.

BAY CITY MODEL 20, Bay City Shovel Co., Bay City, Mich., 8½x11, 6 pages.

HEAVY DUTY DREDGING PUMP, Morris Machine Works, Baldwinsville, N. Y., 8½x11, [4] pages.

TRAP-O-SPRAY, Littleford Bros., Cincinnati, Ohio, 8½x11, 4 pages. Traffic line marker.

SKIP HOIST AND DRAG LINE MACHINERY, Palmer-Bee Co., Detroit, Mich. 7x10, [64] pages.

Z PILES, Carnegie-Illinois Steel Corp., Pittsburgh, Pa. 8½x11, 15 pages. Z-shaped steel sheet piling.

REX ROADMAKER, MODEL 27-E, Chain Belt Co., Milwaukee, Wis. 8½x11, 19 pages.

HAYNES STELLITED VALVES, Haynes Stellite Co., Kokomo, Ind. 8½x11, 8 pages.

MODEL C PRESSURE DISTRIBUTOR, Littleford Bros., Cincinnati, Ohio. 8½x11, [12] pages. Road oil distributor.

Business Notes

HOBART BROTHERS CO., Troy, Ohio, has appointed the J. C. GOWING WELDING EQUIPMENT & SUPPLY CO. as exclusive distributor for Hobart electric arc welders in Southern California.

JAMES E. DELONG, formerly executive vice-president of Waukesha Motor Co., Waukesha, Wis., has been appointed general manager of the concern. He will continue as head of the executive board.

THE CARNEGIE-ILLINOIS STEEL CORP. has retained ROBERT E. KINKEAD, consulting engineer, to make a survey of the company's welding operations.

AMERICAN BRAKE SHOE & FOUNDRY CO., Newark, N. J., has acquired the Vulcan Wheels, Inc., also of Newark, which it will operate as one of its divisions.

THE FALK CORP., Milwaukee, Wis., announces the appointment of M. A. CARPENTER as sales manager to succeed L. A. GRAHAM.

CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

Calif., Palo Alto—City made plans waterworks improvements, incl. 8,000 ft. 8 in., 5,700 ft. 6 in. watermains in Embarcadero Annex District, also 21 double fire hydrants, twenty-nine 6 in. and seven 8 in. valves, miscellaneous fittings. $25,000 or more. J. F. Byxbee, city engr.

Calif., Woodlake — Woodlake Utility Dist. plans election in April to finance construction of first unit or complete water system. Ultimate cost exceeds $25,000.

Conn., Plymouth—Terryville Water Co. making plans waterworks, incl. pumping water from Terryville Reservoir to standpipe to be located Town Farm, constructing watermains East Main St., Harwinton Ave., Maple, South and North Sts., Hillside Ave., servicing 140 houses and installing 16 hydrants. $50,000. J. Cafferty, Main St., Terryville, engr.

Idaho, Twin Falls—City plans constructing 14.5 mi. 24 in. supply line. $300,000. J. E. Hayes, city engr.

La., New Orleans—Orleans Levee Bd. plans laying 6 in. water line under Bayou St. John, 2 ft. underground surface, 2,400 ft. above mouth of bayou. Permission has been asked from War Dpt. for project. Orleans Levee Bd. New Orleans, engr.

Me., Bangor—City, J. G. Wallace, mgr., City Hall, plans rein.-con. flume. $100,000 or more. Maturity indefinite.

Mass., Amesbury—Town making plans and soon takes bids furnishing, installing two 12 in. electrically-operated gate valves, incl. 3,000 ft. conductor cable and control stations. P.W.A. project. Weston & Sampson, 14 Beacon St., Boston, engrs.

Mass., Ashland—Town, H. J. McDonald, chn. Bd. Selectmen, Town Hall, plans furnishing, installing booster pumping equipment for watermain in High St. $1,500.

Mass., Canton—Town plans water system extensions. $25,000 appropriated. M. F. Ward, water comr.

Mass., Mansfield—Town appropriated funds for watermain replacements, $55,000. W.P.A. and $17,200 waterworks extension. Private plans. Water Dpt., Town Hall.

Mass., Rockland—Town, H. Torrey, chn. Bd. Selectmen, Town Hall, preliminary plans in progress, constructing elevated steel water tank. Est. about $100,000. Noted Oct. 4, C. D.—Oct. 10, E. N.-R.

Mass., Whitman—Town voted $25,000 appropriation for waterworks extensions.

N. H., Belmont—Town, Bd. Selectmen, Town Hall, will not construct water supply system. Project abandoned. H. M. Brand, Milton, engr. Noted Jan. 21, C. D.—Nov. 14, E. N.-R.

N. J., Florence—Florence Twp. Com. to seek new Federal grant for township sewerage system. Plan revived for system to cost in excess of $100,000. Noted Sept. 3, C. D.—Sept. 5, E. N.-R.

N. Y., Bayville—Village indefinitely postponed construction of municipal water system, because of lack of federal funds. Noted Nov. 14, C. D.—Nov. 21, E. N.-R.

N. Y., Centre Island — Village indefinitely postponed construction of municipal water system, through lack of federal funds. Noted Dec. 6, C. D.—Dec. 12, E. N.-R.

N. Y., Dresden—City making surveys municipal water supply, incl. 30,000 gal. reservoir with pipe line about 1 mi. long, alternative involves construction of pumping station, 30,000 gal. stand pipe. W. T. Field, Watertown, engr.

O., Coshocton — City plans water softening and filtration plant. $164,000. Council arranging for sale of bonds to finance project.

Wash., Camas—Council soon takes bids constructing 1 m.g. reservoir, 2,800 ft. new pipe line, installing of turbine, pump and motor, constructing pump house. Council authorized $15,000 in bonds to be used with $6,000 W.P.A. funds.

Wash., Hoquiam — City making plans constructing small dam on Heerman Creek, and clearing, grubbing flooded area above dam, changing pipe line and constructing lower dam on north fork of Little Hoquiam River, clearing, burning brush and forest debris, clearing Davis Creek pipe line, painting and rebanding part of line. W. Lovejoy, City Hall, engr. Noted Nov. 20, C. D.—Nov. 28, E. N.-R.

Wash., Kennewick — City plans uncovering, salvaging and backfilling 3,260 ft. pipe and laying 1,000 ft. wood stave pipe; clearing, leveling right-of-way along pipe lines, 9,400 ft.; clearing and leveling along canal banks, 29,646 ft. W.P.A. funds allotted.

Wash., La Center—City plans clearing, grubbing for supply line from diversion dam to reservoir, reservoir excav., ditching, laying pipe and backfilling and constructing concrete reservoir. W.P.A. funds approved. Noted Nov. 8, C. D.—Nov. 14, E. N.-R.

B. C., Kamloops—City plans general improvements to waterworks system. $26,000. Proposed bonds to be voted. R. H. Lee, City Hall, engr.

B. C., Olivier—Town, D. G. McCrae, town engr., takes bids this spring for erecting water tank.

BIDS ASKED

Calif., Coalinga — E. McCroskey, city clk., taking bids furnishing complete water well pumping unit, 900 g.p.m. against direct head of 55 lb. pressure in 10 in. main.

†**Calif., Farallon Island**—Mar. 25, by Pub. Wks. Officer, U. S. Navy Yard, Mare Island, replacing two 10,000 gal. fresh water tanks, salt water piping, plumbing fixtures in quarters and for extending sewer outfalls at U. S. Naval Director Finder Station.

Colo., Salida—See "Contracts Awarded."

Mass., Salem—See "Contracts Awarded."

Mass., Wilmington—See "Contracts Awarded."

N. H., Keene—See "Contracts Awarded."

N. Y., Glens Falls—Mar. 16, by Bd. Water Comrs., City Hall, constructing 275 ft. earth dam with concrete and sheet pile cut-offs, and concrete, brick pumping station with pipes, valves, pumps, motors and other equipment. $120,355. P.W.A. project. Noted Feb. 7, C. D. Feb. 13, E. N.-R.

N. Y., Goshen—Mar. 19, by Village Trustees, Village Hall, J. F. Kane, mayor, constructing 24,000 ft. 6 and 8 in. watermains, valves, specials, service connections. $63,687. P.W.A. project.

N. Y., Gowanda—J. Metz, village clk., taking bids on structural steel, reinforcing steel, pump for proposed water supply system extension. To exceed $23,000. W.P.A. project. E. R. Cotton, 78 Highland Dr., Williamsville, engr. Noted Jan. 31, C. D.—Feb. 6, E. N.-R.

N. Y., Jordan—See "Contracts Awarded."

N. Y., Newfane—See "Contracts Awarded."

N. Y., Red Hook—Mar. 20, by Village, constructing waterworks, Contrs. B, C and F, $63,892. P.W.A. project. Malcom Pirnie, 25 West 43rd St., New York, engr.

N. C., Morven—Mar. 18, by Town Clerk, Contr. 1, well drilling, two 6 in. wells, approximately 160 ft. deep; Contr. 2, 100,000 gal. tank on 90 ft. tower; Contr. 3, general construction, 10,720 lin.ft. 4- to 8-in. watermains with necessary hydrants, valves, services and meters, 5,270 lin.ft. 3 in. and smaller watermain valves, meters, etc., 2 pump houses and foundations to water tank. $38,181. P. M. Van Camp, Southern Pines, consult. engr. Noted Feb. 18, C. D.—Feb. 20, E. N.-R.

Pa., Morrisville—Mar. 24, by Council, waterworks improvement. $38,000. Former bids rejected. P.W.A. allotment for part of work. H. H. Lee, 333 North Pennsylvania Ave., engr.

Tex., Orange Grove—Mar. 26, by City, c/o A. Wendt, mayor, waterworks system, incl. distribution system, fire hydrants, gate valves and boxes, one 50,000 gal. elevated steel tank on 100 ft. tower, one 50,000 gal. concrete surface reservoir, pump station, pumps, motors, tapping machine, etc., 10,000 lb. c.i. specials, 6,700 ft. 1 in. G.S. pipe, 17,045 ft. 2- to 8-in. c.i. pipe. $40,000. P.W.A. project. H. R. F. Helland, Frost Natl. Bank Bldg., San Antonio, engr.

Wis., Tigerton — Mar. 24, by Village, constructing elevated water tank. Druar & Milinowski, 830 Globe Bldg., St. Paul, Minn., engrs. Noted Dec. 30, C. D.—Jan. 2, E. N.-R.

CONTRACTS AWARDED

Calif., San Diego—La Mesa-Lemon Grove and Spring Valley Irrigation Dist., constructing 2 mi. 48 in. electric welded steel pipe built in connection with city of San Diego, to Consolidated Steel Corp., 6501 Slauson Ave., Los Angeles, $127,176. Noted Feb. 10, C. D.

Colo., Salida—City, constructing 6 mi. 4 in. pipe line from Poncha Hot Springs to municipal bathhouse, day labor. $34,000. B. McDonough, Salida, W.P.A. engr. Work started.

Kan., Mound Valley—City, complete waterworks, to O'Neal Constr. Co., Leavenworth, $43,780. Est. $50,000. **P.W.A.** Noted Feb. 18, C. D.—Feb. 20, E. N.-R.

Mass., Reading—Town, filter equipment for water plant, to Simplex Valve & Meter Co., 68th and Upland Sts., Phila., Pa. **P.W.A.** Noted Jan. 14, C.D.—Jan. 16, E.N.-R., under "Contracts Awarded."

†*Federal Government.*

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Projects $500,000 and over symbol ★
Reports noted back to former issues are designated as follows:
C. D. Construction Daily
E. N. R. Engineering News-Record
Federal Government projects symbol †

◆

Mass., Salem—City, F. P. Morse, engr., City Hall, c.i. water pipe, post hydrants and water services in Grove St., $10,000; c.i. water pipe, post hydrants and appurtenances in Kernwood St., $16,000, day labor under W.P.A. Owner to purchase materials.

Mass., Wilmington—Town, C. D. Harriman, chn. Water Comm., Town Hall, extending watermains in Nassau Ave., $4,000; 600 ft. various sized mains, various streets, $3,500; 3,500 ft. 6 and 10 in. in Shawsheen Rd. and Lake St., $10,000; 1,300 ft. 8 in. Glen Rd., $4,000; 4,100 ft. 8 in. Salem St., $7,000; 4,000 ft. 12 in. Chestnut St., $15,000; 2,600 ft. 12 in. Lowell St., $10,000; 6,700 ft. 10 in. Woburn St., $14,000; 1,300 ft. 8 in. Aldrich St., $3,000; 1,300 ft. 10 in. Main St., $6,000; 2,500 ft. 8 in. Bontwell St., $10,000, day labor under W.P.A. Grand total $86,500. Owner purchases materials.

Mich., Muskegon—City, 1 m.g. water storage tank, to Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill. **P.W.A.**

Minn., Minneapolis—F. S. Gram, city purch. agt., 2 ammoniators for Waterworks Dpt., to Wallace & Tiernan Co., 416 Flour Exchange Bldg., $1,504. Bids Feb. 4. Noted Jan. 29, C. D.

★ **Mo., St. Louis**—Bd. P. Service, City Hall, furnishing, coating and delivering 17,357 ft. 60 in. welded steel pipe 9/16 in. thick and 29,400 lin.ft. 60 in. welded steel pipe 4 in. thick with couplings required for Conduit 2-A, from Howard Bend Pumping Station on Missouri River at Hine to Stacy Park Reservoir in St. Louis Co., to Bethlehem Steel Co., 1010 Pine St., St. Louis, Mo., and Bethlehem, Pa., $542,880; laying pipe, etc., to Martin & Reilly, 7227 Lindell Blvd., University City, $151,792. **P.W.A.** Bids Feb. 21. Noted Feb. 28, C. D.—Jan. 30, E. N.-R.

N. H., Keene—City, P. P. Babbidge, supt. Water & Sewers, City Hall, c.i. watermain from Edgewood to Swanzey, day labor. $30,000. R. Clark, city engr.

N. Y., Jordan—Village, reconstructing part of water distribution system, incl. laying 7,830 ft. watermains, 3,500 ft. service pipe, settling gate valves, resetting hydrants, service connections, 3,670 cu.yd. excav. and backfill and removing and replacing concrete pavement, relief labor. $29,000. **W.P.A.** G. L. Noble, Old Post Office Bldg., Syracuse, Procurement Officer W.P.A., will purchase materials.

N. Y., Newfane—Village, constructing water supply system to supply villages of Olcott, Burt and Newfane with water from Lake Erie, incl. filtration plant, pipe lines, pumps, relief labor. $48,092. **W.P.A.** E. Noonan, Bailey Bldg., Lockport, Procurement Officer W.P.A., will purchase materials. Noted Aug. 14, C. D.—Aug. 22, E. N.-R.

O., Middletown—City, furnishing, erecting metal stack at waterworks plant, to Littleford Bros., 453 East Pearl St., Cincinnati, $1,360. **P.W.A.** Bids Feb. 27, awarded Mar. 4. Noted Feb. 24, C. D.

Pa., Allentown—Bureau of Water, 615 Linden St., furnishing, Contr. 1, 4,770 tons pipe and specials, to Donaldson Iron Wks., Emaus, $163,761; Contr. 2, valves, fire hydrants, to Renssalaer Valve Co., Troy, N. Y., $8,634. **P.W.A.** Bids Feb. 25. Noted Feb. 18, C. D.—Feb. 20, E. N.-R.

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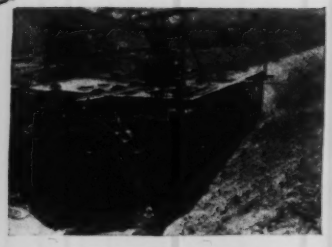

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SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

Calif., Knights Landing—Surveys being made by Lion's Club with view to constructing sewerage system for town. $25,000 or more.

Calif., Ontario—City preliminary plans outfall sanitary sewer to serve part of city lying east of Campus Ave. $70,000. W.P.A. project. C. T. Holmer, City Hall, engr.

Ill., Duquoin—City soon takes bids constructing sewage works. P.W.A. project. Pearse, Greeley & Hansen, 6 North Michigan Ave., Chicago, engrs.

Ill., Elmhurst—City soon takes bids constructing sewerage works. Alvord, Burdick & Howsen, 20 North Wacker Dr., Chicago, engrs.

Ill., Ottawa—City plans constructing sewers. Rejected P.W.A. allotment. Greeley & Hansen, 6 North Michigan Ave., Chicago, engrs. Noted Nov. 8, C. D.—Nov. 14, E. N.-R.

Ill., West Dundee—City soon takes bids constructing sewage plant. V. H. Kasser, city engr. Alvord, Burdick & Howsen, 20 West Wacker Dr., Chicago, engrs.

Minn., Renville—City, F. R. E. Dunwell, clk., plans nearing completion and takes bids late in March, sewage disposal plant. $30,000. P.W.A. project. M. E. Chamberlain, Montevideo, engr.

Mo., Clayton (St. Louis P. O.)—W. S. Smith, secy. Bd. Trustees Clayton Outfall Sewer Dist., St. Louis Co. Bank Bldg., soon takes bids constructing sewers in Clayton Outfall Sewer Dist. $60,000. P.W.A. project. Kinsey Eng. Co., c/o E. A. Fulton, St. Louis Co. Bank Bldg., engrs.

N. J., Bordentown—W. Warrack, mayor, and Council, plan improving sewage plant, place new beds, etc. $75,000. $25,000 of sum to go for labor. P.W.A. grant. H. Eaton, Farnsworth Ave., engr. Noted Feb. 28, C. D.—Mar. 7, E. N.-R.

O., Columbus—City plans 6,000 ft. concrete and segmental block storm sewer in Oakland Park Dist., Contr. 67, Part 2. $85,500. P. W. Maetzel, City Hall, engr.

Pa., Beaver Falls—Boro making plans sewage disposal plant, incl. two 20,000 sq.ft. sludge beds and two 22x40 ft. concrete tanks. $80,000. J. N. Chester Engineers, Clark Bldg., Pittsburgh, engrs. I. P. Lindeman, Borough Bldg., boro engr.

Pa., Wilcox—Elk Tanning Co., G. W. Daugherty, genl. mgr., Ridgway, plans completed waste disposal system, addition to tannery, settling tanks, pumps and handling equipment for disposal of waste materials. $20,000-$25,000. F. Moffatt, c/o owner, engr.

Tex., Port Lavaca—City, C. M. Dudgeon, applying for additional P.W.A. allotment, plans held up pending action, for sanitary sewer extensions, incl. extending lines into outlying districts to provide for building expansion now in progress account recent oil development. Original allotment $55,000. P.W.A. project. J. C. McVea, Port Lavaca, engr.

Utah, Ogden—City plans laying 12,000 ft. 8 in. and 1,500 ft. 10 in. sewer tile, constructing 37 new manholes at 18 places on present sanitary sewerage system. $31,700. C. Coray, city engr.

Utah, Sandy—City plans constructing 3 mi. sanitary sewers along 1st North, 2nd South and 7th South Sts., and sewage disposal plant. $40,000. Caldwell & Richards, Templeton Bldg., Salt Lake City, engrs.

Wash., Tacoma—City plans trunk sewer in North Cheyene St. from North to Mullen Sts. $61,500. C. Forsbeck, City Hall, engr.

Que., Joliette—Municipality making plans rein.-con. and vitr. clay sewer in Gaspard St. $200,000. **Maturity in spring.** E. H. Lippe, Town Hall, engr.

BIDS ASKED

Ill., Chicago—Mar. 19, by Sanitary Dist. of Chicago, 910 South Michigan Ave., constructing Calumet Intercepting Sewer, Contr. 15. P.W.A. project. J. J. Sullivan, clk.

Mich., Detroit—Mar. 20, by Dpt. P. Wks., Sect. 11, Detroit River Interceptor Sewer, in tunnel of approximately 4,527 lin.ft. 16 ft. inside diam., in Jefferson Ave. from Solvay to Military Aves. L. G. Lenhardt, comr. P. Wks. J. H. Stringham, city engr.

Minn., St. James—Mar. 26, by City, L. Grogan, clk., sewage disposal plant. $35,000. P.W.A. project. Rose & Harris, 416 Essex Bldg., Minneapolis, engrs. Noted Dec. 9, C. D.—Dec. 12, E. N.-R.

Neb., Lawrence—Mar. 17, by City, constructing sewers and sewage disposal plant. $27,209. P.W.A. project. H. A. Davis, Crete, engr. Noted Feb. 11, C. D.

Neb., Omaha—See "Contracts Awarded."

N. Y., Buffalo—Mar. 20, by Buffalo Sewer Authority, City Hall, constructing 2,380 lin.ft. 60 in. concrete pipe drain; 761 lin.ft. 10- to 15-in. sanitary sewers, chambers, connections, manholes, etc., for Div. F, Southern Section; and 2,536 lin.ft. concrete drain, 1,840 lin.ft. 10 in. sanitary sewer, 1,000 lin.ft. 6 in. watermain, etc., Div. G, Intermediate Section, for Michigan Avenue Sewer Dist. P.W.A. pr... D. H. McCarriagher, chn. Noted Mar. 3, ... —Mar. 5, E. N.-R.

O., Berea—Mar. 17, by City, Contr. 1, ... lin.ft. 8- to 18-in. vitr. sewer pipe, 2,865 ... 6- to 12- in. spiral welded steel pipe, ... cu.yd. excav., 1,000 cu.yd. rock excav. ... sewage disposal plant: Contr. 2, lands... $1,600; Contr. 3, laboratory equipment and ... niture for sewage disposal plant, $4,000. P. ... project. R. F. MacDowell, Chester-Tw... Bldg., engrs., Noted Jan. 23, C. D.—Jan. ... E. N.-R.

O., Columbus—Mar. 24, by P. W. Maetzel, city engr., 3,175 ft. storm sewer in Brook... Dr. from Main St. to James Rd. in Bliss ... Dist., P.W.A. Contr. 58, Part 4, for City. ... 000.

Pa., New Kensington—Mar. 17, by City of New Kensington and Boro of Arnold, 72 ... and 48 in. brick or rein.-con. storm sew... incl. 390,000 sewer brick, 939,000 paving b... 510 bbl. cement, 340 bbl. hydrated lime, ... tons sand, 250 lin.ft. 15 in. terra cotta ... pipe, 200 cu.yd. 1-2-3 transit mixed conc... 11 inlet and 6 manhole castings, 100 lb. jut... tons asphalt joint compound, 80 manhole st... 60 lin.ft. 8 gage metal pipe for jacking u... railroad and incl. liner plates rivet and ... asphalt coating, alternate on 610 lin.ft. 72 ... and 560 lin.ft. 4- to 8-in. rein.-con. pipe storm sewer, 50,000 sewer brick, 6,000 invert li... tile, 200 bbl. cement, 40 bbl. hydrated lime, ... 90 tons sand, 25,000 ft. BM. bracing lumber. R. M. Douglas, Columbia Bldg., Pittsburgh, engr.

Wis., Kaukauna—Mar. 26, by City, sewage disposal plant. $170,000. P.W.A. project. Greeley & Hansen, 6 North Michigan Ave., Chicago, Ill., engrs. Noted Feb. 18, C. D.—Feb. 20, E. N.-R.

Wis., Oostburg—Mar. 20, by Village, constructing 10,103 lin.ft. 8 and 12 in. sanitary sewer, 35 manholes, 1 drop manhole, 3,204 ft. 8- to 12-in. concrete cradle for 8- to 12-in. pipe, 10,000 sheeting in place, 400 ft. 6 in. risers, 3,000 ft. 6 in. sewer service connections. J. Donohue Eng. Co., Sheboygan, engrs.

CONTRACTS AWARDED

Calif., Los Angeles—Directors Los Angeles Co. Sanitation Dist. 2, constructing 26,398 ft. 18 in. vitr. clay sanitary sewer, 62 manholes, 15 junction chambers, 500 tons gravel bed as required Downey-Bellflower trunk sewer from Downey to Pico, to Gogo & Rados, 10024 South Figueroa St., $100,853. **P.W.A.** Bids Mar. 3. Noted Feb. 10, C. D.

Ill., Chicago—Sanitary District of Chicago, constructing superstructure pump and blower house, Div. N, for Southwest Sewage Treatment Plant, Stickney, to Pashen Bros. Co., 33 North LaSalle St., $179,000. **P.W.A.** Bids Feb. 20. Noted Feb. 28, C. D.—Feb. 6, E. N.-R.

Ill., Waukegan—North Shore Sanitary Dist., constructing pumping station substructure, sludge drying beds, settling tank for Highwood Additions, Div. BB, and grit chamber, 2 story settling tank, chlorination tank, outfall structure, steel sheet piling shore protection building, glass sludge enclosure, for Ravine Drive Sewage Treatment Plant, Div. N, to Darrow & Barren, Waukegan, $76,372 and $104,715 respectively. **P.W.A.** Bids Jan. 31. Noted Feb. 10, C. D.—Jan. 16, E. N.-R.

Ill., West Dundee—Village, constructing intercepting trunk line sewer, sewage treatment plant, waterworks structures, etc., Contr. B, to Illinois Hydraulic Co., Elgin. Est. $125,000. Bids Feb. 13. Noted Feb. 7, C. D.—Feb. 6, E. N.-R.

Ind., Tipton—Bd. P. Wks., sewage disposal plant, to T. McKinley, Tipton, $91,210. **P.W.A.** Bids Oct. 3. Noted Sept. 25, C. D.—Oct. 3, E. N.-R.

Kan., Greensburg—City, c/o Clerk, constructing sewers to proposed disposal plant, to Carter Constr. Co., Wichita, $57,000. Est. $65,000. **P.W.A.** Paulette & Wilson, Topeka, engrs. Noted Feb. 18, C. D.—Feb. 20, E. N.-R.

Md., Baltimore—Bd. Awards, constructing sanitary sewer in Sewer Dist. 33, to L. Aiello & Son, 3700 Gough St., $157,792. Bids Feb. 26. Noted Mar. 2, C. D.—Mar. 5, E. N.-R.

Mass., Boston—City, C. J. Carven, comr. P. Wks., City Hall Annex, constructing Sect. 14 Stony Brook Sewer, West Roxbury, Part of P.W.A. Project 4193, concrete construction, to Chas. Andreassi & Co., 8 Gartland St., Jamaica Plain, $59,458. Bids Feb. 18, awarded Mar. 6. Noted Feb. 24, C. D.—Feb. 13, E. N.-R.

★ **Mass., Medford**—Commonwealth of Massachusetts, Metropolitan Dist. Comn., W. E. Whittaker, secy., 20 Somerset St., Boston, constructing Sect. 11 of North Metropolitan Relief Sewer, to V. Barletta Co., 8 Whipple Ave., Jamaica Plain, $502,880, using concrete arch tunnel. **P.W.A.** Bids Feb. 17, awarded Mar. 4. Noted Feb. 21, C. D.—Feb. 13, E. N.-R.

Mass., Medford—Commonwealth of Massachusetts, Metropolitan Dist. Comn., W. E. Whittaker, secy., 20 Somerset St., Boston, constructing Sect. 112, North Metropolitan Relief Sewer, Medford and Winchester, to C. & R. Constr. Co., 75 Bradeen St., Roslindale, $358,800, concrete arch construction. **P.W.A.** Bids Feb. 17. Noted Feb. 21, C. D.—Feb. 13, E. N.-R.

Mass., Winchester—Commonwealth of Massachusetts, Metropolitan Dist. Comn., W. E. Whit-

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†*Federal Government.*

sewerage, etc. (Continued)

tailer, secy., 20 Somerset St., Boston. Sect. 114, North Metropolitan Relief Sewer, to E. M. Matz, 25 Zamora St., Jamaica Plain, $174,-500. **P.W.A.** Bids Feb. 27, awarded Mar. 6. Noted Mar. 4, C. D.—Feb. 20, E. N.-R.

Mass., Winchester—Commonwealth of Massachusetts, Metropolitan Dist. Comn., W. E. Whittaker, secy., 20 Somerset St., Boston. P.W.A. Project 1098 (part), Sect. 113, North Metropolitan Relief Sewer, to A. Baruffaldi, 52 Powder House Blvd., Somerville, $157,480. **P.W.A.** Bids Feb. 19, awarded Feb. 28. Noted Feb. 28, C.D.—Feb. 13, E.N.-R.

Neb., Omaha—City, constructing sewers in 36th and Meredith Sts., $33,000, and 3rd and Grover Sts., $3,900, relief labor. **W.P.A.** Procurement Div., Union Terminal Bldg., Lincoln, will purchase materials.

N. Y., Auburn—W. E. Bonley Co., general contractors, Flint Blk., Auburn, c.i. pipe for sewage disposal plant, for City, to Warren Fdry. Co., 11 Bway., New York***structural steel, to Auburn Iron Wks., 143 Kelsey St., Auburn ***roofing, to Central City Roofing Co., East Erie Blvd., Syracuse. **P.W.A.** Noted Dec. 12, C. D.—Dec. 19, E. N.-R., under "Contracts Awarded."

O., Wapakoneta—City, activated sludge sewage disposal plant, incl. separators, sludge tanks and buildings, to Green & Sawyer, Lima, $66,-000. Est. $81,818. Subject to P.W.A. approval.

Pa., Farrell—City, constructing sewage disposal plant, raw sewage pump station, mechanical bar screens, primary tanks, sludge digestion tank, control house, gas control equipment, terra cotta sewer piping, 12- to 18-in. and 10 in. c.i. pipe, glass covered sludge dry beds, to H. Platt Co., 922 Raspberry St., Erie, $96,371. Est. $100,000. **P.W.A.** Start work soon as weather breaks. R. H. Craig, 222 North 3rd St., Harrisburg, engr. H. W. Cole, city engr.

Tex., Fort Worth—City, c/o G. D. Fairtrace, mgr., improving sewage treatment plant, new tanks, sludge beds, etc., to McKenzie Constr. Co., Smith-Young Tower, San Antonio, $147,-470. **P.W.A.** D. L. Lewis, City Hall, engr.

Wis., Manitowoc—City, constructing sanitary sewers, Contr. A, to Bahr Constr. Co., Manitowoc, $34,748. **P.W.A.** Bids Feb. 21. Noted Mar. 2, C. D.

Wis., Sheboygan—City, constructing sewers, Contr. C, to Utility Constr. Co., Sheboygan, $77,300. **P.W.A.** Bids Feb. 21. Noted Feb. 28, C.D.—Feb. 13, E.N.-R.

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

Calif., Santa Cruz—Santa Cruz Co. plans 125 ft. bridge over Corralitos Creek, near Richdale. Santa Cruz Co., $25,000. Bridge recently destroyed. Temporary bridge will be constructed from salvaged materials, pending new structure. L. Bowman, Santa Cruz, co. surv.

Calif., Yuba City—Sutter Co. plans retention of present central draw span and erection of two new spans, 200 ft. and 267 ft. long for Nicolaus Bridge over Feather River. $145,000. E. Von Goldern, 2nd and C Sts.

Conn., Bristol—City, P. Wks. Dpt., D. J. Donovan making plans 2 bridges to replace present structures, one the West Washington Bridge over Mine River $7,530, and other new rein.-con. bridge Malone's Pond on Pine St., $20,000. C. Buell, City Hall, engr.

Mass., Fall River—T. J. Logan, comr. P. Wks., City Hall, plans rein.-con., structural steel bridge over Quequechan River. $30,000. **Maturity soon.**

Mass., Springfield—City, C. W. Phillips, supt. Streets, plans rein.-con., steel bridge over Mill River, replacing present bridge. $25,000. P.W.A. project. S. N. King, 646 Summer Ave., engr.

Missouri—State Hy. Comn., Jefferson City, soon takes bids constructing two 50 ft. and one 45 ft. rein.-con. girder bridges over Chicago, Burlington & Quincy R.R. on road from Bucklin north and south, Route SK, WPGM 645, Linn Co., $23,000; reconstructing present bridge to provide 34 ft. roadway single track layout, incl. one 43 ft. beam span on creosoted pile bent substructure on Route 13, WPGM 8, under Chicago, Burlington & Quincy R.R., Harrison Co. ***one 76 ft. and two 49 ft. steel plate girder spans, three 22 ft. rein.-con. tower bent spans, 480 ft. retaining wall, abutments, 42 ft. roadway, two 5 ft. sidewalks, over Missouri-Pacific R.R. on Chippewa St., St. Louis, $23,000; one 33 ft. and two 29 ft. rein.-con. slab spans over Wabash R.R. on Laurel and Waterman Aves., St. Louis, $23,000; three 96 ft. steel plate girder spans continuous and two 41 ft. rein.-con. deck girder spans, two 22 ft. rein.-con. tower bents, 320 ft. rein.-con. retaining wall, two 5 ft. sidewalks, on Kingshighway, St. Louis, $23,000; 12x8 ft. barrel section with approach ramps, underpass under St. Louis, San Francisco R.R., on St. Louis-Springfield Rd. in Afton, $23,000; one 33 ft. and two 28 ft. rein.-con. slab spans with concrete substructure over Wabash R.R., on Hamilton Ave., St. Louis, $23,000; twelve 74.5 ft. and two 46 ft. rein.-con. deck girder spans, 42 ft. roadway, with rein.-con. substructure on road from Kirkwood south Route 77, WPGM 94, at Kirkwood, St. Louis Co., $23,000; 12x8 ft. rein.-con. barrel section with approach ramps, pedestrian und-rpass on road from Kirkwood South, under St. Louis, San Francisco R.R., WPGM 94, Kirkwood Co., St. Louis Co., one 34 ft. and two 29 ft. rein.-con. slab spans over Wabash R.R. on DeBalivere Ave., WPGM 735, St. Louis, $23,000; fifteen 14 ft. and two 41 ft. rein.-con. deck girder spans, 262 ft. rein.-con. retaining wall, 42 ft. roadway over St. Louis, San Francisco R.R., Route 30, WPGH 78, St. Louis Co., $23,000; three 45 ft. rein.-con. deck girder spans, 24 ft. roadway, over St. Louis, Southwestern R.R., on road from Poplar Bluff South, Route 53, WPGM 221, Campbell, Dunklin Co., $23,000; one 55 ft. I-beam span, wrought iron deck, 4 track layout, under Missouri Pacific R.R., from St. Louis South, Route 67, Project 80, St. Louis Co., $23,000; bridge over Chicago, Burlington & Quincy R.R. on road from Calleo to North and South, Route SH, Macon Co., $23,000; 6,000 lin.ft. rein.-con. retaining wall from Delmar St. to Union Ave., along Wabash R.R. tracks in St. Louis, $23,000. T. H. Cutler, ch. engr.

New Jersey—State Hy. Dpt., Trenton, plans eliminating 2 grade crossings, Pennsylvania R.R., eliminate grade crossing Route 25, near Hightstown, $105,000; O/e at Deans, Middlesex Co., for Pennsylvania R.R., $183,000; high bridge Hunterdon Co., Central R.R., $16,000. Est. $304,000.

New York—Dpt. P. Wks., Albany, making plans steel, concrete highway bridge on Whitney Point-Greene Hy. Part 1A, Broome Co.; concrete, steel bridge on Oxford-McDonough Hy. 224, Chenango Co.; rein.-con. bridge on Hy. 1623, on Mecklenberg-Ithaca Hy., Tompkins Co.; and 2 steel, concrete bridges, 2 on Perry City-Trumansburg Hy. and other on Mecklenberg-Ithaca Hy., Schuyler and Tompkins Counties. To exceed $92,000.

N. Y., Dobbs Ferry—Dpt. P. Wks., Albany, plans constructing concrete lined tunnel to eliminate dangerous Broadway hill from Elm to Cedar Sts. To exceed $100,000. Surveys have been completed by New York State, under supervision of J. S. Bixby, district state engr., Poughkeepsie. T. F. Farrell, Albany, state hy. engr.

Ore., Bend—State Hy. Comn., Salem, bids in April, constructing undercrossing for railroad at Franklin St. $65,000-$90,000. Cost of lighting work to be borne by City.

Pa., Drinker—Erie R.R. Co., Midland Bldg., Cleveland, O., plans elimination of grade crossing, incl. relocation of highway and construction steel, concrete bridge with 24 ft. roadway over railway tracks on State Hy., Route 335, near Drinker, Jefferson Twp., Lackawanna Co. $114,467.

★ **Pa., Erie**—Comrs. Erie Co., Court House, making final plans highway bridge improvement program throughout county, replacing 91 bridges on secondary highway system, $400,000. **Maturity early in spring.** W. H. Supplee, Erie, co. engr.

Texas — State Hy. Comn., H. Hines, chn., Austin, plans I. G. and N. R.R. underpass and approaches, 1 mi. north of Devines, Hy. 2, W.P.G.H. 237, Part 5, Medina Co. New P.W.A. project.

Texas—State Hy. Comn., H. Hines, chn., Austin, cancelled bids to have been opened Mar. 11, constructing Gulf, Colorado and Santa Fe R.R. underpass and approaches, Hy. 19, WGM 370-B, Montgomery Co. $120,000. New P.W.A. Will readvertise at later date. Noted Mar. 3, C.D.

Texas — State Hy. Comn., H. Hines, chn., Austin, plans T. P. R.R. underpass approaches 0.565 mi. long, and brick pavement, Hy. 1, WPGH 132-B, Parker Co.; I. and G. N. R.R. underpass and approaches 0.555 mi. long, Hy. 19, WPGM 370-B, Montgomery Co.; constructing G. C. and S. Fe R.R. underpass and roadway approaches 0.552 mi. long, Hy. 36, WPGH 28-A, Burleson Co.; com. takes bids T. and N. O. R.R. underpass approaches, etc., 1.298 mi. long, Hy. 16, WPGH 151-B, Bee Co., $170,000; B. and R. I. and T. and N. O. R.R. overpass approaches 0.439 mi. long, and concrete pavement Hy. 7, WPGM 137, Part 2, $167,000. New P.W.A. project. Approved by Federal Bureau for near future letting.

Tex., Edinburg — Hidalgo Co. plans 5 new bridges one each in Mercedes, Donna, and Edcouch, other 2 not yet announced. P.W.A. project. H. P. Griffin, Edinburg, engr.

Utah, North Farmington — Utah State Rd. Comn., Salt Lake City, preliminary plans constructing underpass at intersection of Mountain Hy. with Salt Lake-Ogden Hy. $50,000. K. C. Wright, state road engr.

Washington—State Hy. Dpt., Olympia, making plans steel, concrete structure, with present approaches to be used, diversion bridge of piling and wood deck to be built over Naselle River, Ocean Beach Hy. $55,000. L. V. Murrow, State Hy. Dpt. engr.

Wash., Tacoma — City, City Council orders C. D. Forsbeck, engr., City Hall, to investigate matter of replacing present gate with hydraulic, electrically operated gate to stop traffic on 11th St. bridge. $23,750.

Wis., Milwaukee — City, constructing new deck on 27th St. Viaduct. R. E. Stoelting, comr. Will apply for federal funds.

Ont., Little Current—Ontario Provincial Govt., Toronto, plans converting present Canadian

†Federal Government.

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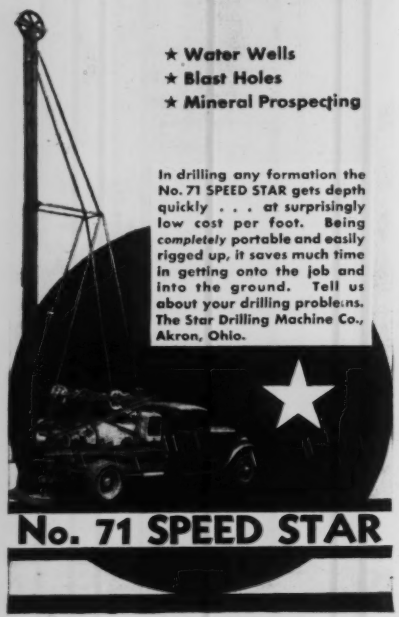

No. 71 SPEED STAR

Bridges, etc. (Continued)

Pacific Ry. bridge into highway bridge, approaches will be built at each end of bridge. Est. about $25,000.

BIDS ASKED

Arkansas — Mar. 19, by State Hy. Comn., Little Rock, constructing 5 span, 528 ft. rein.-con. arch bridge over White River, Baxter Co., incl. 9,985 cu.yd. solid rock and 641,138 miscellaneous excav., $140,000; 110 lin.ft. rein.-con. overpass over M. O. P. Ry., Marion Co., $20,000. W. W. Zass, 316 Fern St., Little Rock, engr.

Iowa—Mar. 17, by State Hy. Comn., Ames, constructing one 526 multiple span overhead crossing structure on Primary Rd. 3, over C. R. I. & P. Ry., east of Centerville, Appanoose Co., incl. 700 cu.yd. Class 1 excav.; 1 rein.-con. box and 1 rein.-con. pipe culvert, 1 multiple span overhead crossing on secondary road, at C. G. W. Ry. crossing north of Farley, Dubuque Co., 310 cu.yd. Class 1 excav. F. R. White, ch. engr.

Kansas—See "Streets and Roads."

New Hampshire—Mar. 19, by State Hy. Dpt., Concord, concrete slab bridge on I-beams over railroad, in Plaistow, Rockingham Co. $45,000. J. W. Childs, Concord, N. H., engr.

New York—See "Streets and Roads."

N. Y., Binghamton—Mar. 23, by C. A. Harrell, city mgr., constructing multiple span, rein.-con. arch bridge with roadway and footwalks, sidewalks across Chenango River at Ferry St. $277,950. P.W.A. project. A. B. Cohen, 1 Madison Ave., New York, consult. engr. Noted Jan. 21, C. D.—Feb. 6, E. N.-R.

North Dakota—See "Streets and Roads."

O., Hamilton—Mar. 20, by Comrs. Butler Co., Court House, two 105 ft. span steel truss highway bridge, concrete pier and abutments over Fourmile Creek on Hamilton-Eaton Rd., in St. Clair Twp. $45,000. P.W.A. project. F. S. Hammerle, Court House, co. engr.

Ohio—See "Streets and Roads."

Vermont—Mar. 20, by State Hy. Dpt., Montpelier, rein.-con. and steel bridge with gravel surface approaches, Route 121, Grafton. To exceed $25,000. H. E. Sargent, Montpelier, ch. engr.

LOW BIDDERS

★ **Ill., Chicago**—Chicago Park Dist., Burnham Park, Mar. 3, constructing superstructure, steel work and underground drainage for approaches, and retaining wall along Randolph Street Extension in Grant Park, from Great Lake Dredge & Dock Co., 104 South Michigan Ave., aproximately $2,100,000. Noted Feb. 18, C.D.—Feb. 20, E.N.-R.

CONTRACTS AWARDED

California—F. O. Bohnett, general contractor, Box 54, Campbell, structural steel for undergrade crossing under tracks of Southern Pacific R.R. at Salinas, Monterey Co., for State Hy. Comn., Sacramento, to Steel Constr. Co., 249 Montgomery St.***reinforcing steel, to Bethlehem Steel Corp., 20th and Illinois Sts. ***expansion joints and copper strips, to Williams-Wallace Co., 160 Hooper St.***cement, to Calaveras Cement Co., 315 Montgomery St., all above in San Francisco***asphalt paving, to A. J. Raisch Co., Burrell Bldg., San Jose*** crusher run and plant mix, to Granite Constr. Co., Bin 9, Watsonville***membrane waterproofing, to Valley Roof Service Co., Salinas ***sewers and outlet pipes, to O. G. Ritchie, 154 North 11th St., San Jose***lighting equipment, to R. Butcher, 1020 Sherwood Ave., San Jose***plumbing equipment, to Western Pump Co., P. O. Box 47, San Jose***aggregates, to Central Supply Co., Salinas. Noted Feb. 17, C. D.—Feb. 20, E. N.-R., under "Contracts Awarded."

California—A. T. Howe, general contractor, 111 Stanford St., Santa Rosa, reinforcing steel for rein.-con. girder overhead crossing, over tracks of A. T. and S. F. R.R., Contra Costa Co., for State Hy. Comn., Sacramento, to Gunn-Carle Co., 20 Potrero Ave., San Francisco, for State Hy. Comn., Sacramento***cement, to Cowell Lime & Cement Co., 2 Market St., San Francisco***concrete aggregates, to Pacific Coast Aggregates, Inc., 85 2nd St., San Francisco ***road grading and surfacing, to Peres & Gatto, 920 Barrett Ave., Richmond. Noted Nov. 29, C. D.—Dec. 5, E. N.-R., under "Contracts Awarded."

California — Peninsula Paving Co., general contractors, 9 Main St., San Francisco, reinforcing steel for undergrade crossing, Jackson St., Hayward, for State Hy. Comn., Sacramento, to Bethlehem Steel Co., 20th and Illinois Sts., San Francisco***structural steel, to Moore Drydock Co., foot of Adeline St., Oakland***to F. G. Amoroso & Sons, general contractors, Keith and Wallace Ave., San Francisco, reinforcing steel for overhead crossing, Williams Ave., San Francisco, San Francisco Co., for State Hy. Comn., Sacramento, to Gunn, Carle & Co., 20 Potrero Ave., San Francisco***lumber, to Loop Lumber Co., Central Basin, San Francisco***structural steel, to Bethlehem Steel Co., 20th and Illinois Sts., San Francisco***concrete, to Ready-Mix Concrete Co., Carolina and Mariposa Sts., San Francisco. Noted Feb. 17, C. D.—Feb. 20, E. N.-R., under "Contracts Awarded."

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California—A. Soda & Son, general co tors, 5231 Grove St., Oakland, reinforcing for undergrade crossing under tracks of S mento Northern R.R. at Mountain Blvd land, Alameda Co., to Gunn-Carle Co., 20 P Ave., San Francisco, for State Hy. Comm ramento***erecting reinforcing steel, to Murphy, 222 Parkview Ave., Oakland** rugated metal culvert pipe, to California rugated Culvert Co., 5th and Parker Sts., ley***structural steel, to Bethlehem Steel 20th and Illinois Sts., San Francisco** castings, to Enterprise Fdry. Co., 2902 19 San Francisco. Noted Jan. 3, C.D.—Ja E.N.-R., under "Contracts Awarded."

Colorado—State Hy. Dpt., Denver, constru railroad underpass with gravel approache hy. between Pueblo and Ordway, State Hy WPMS 414-A, Pueblo Co., to Larson & K 1902 Blake St., Denver, $152,698. Bids Fe awarded Feb. 21. Noted Feb. 24, C.D.

Connecticut—See "Streets and Roads."

Conn., Bristol—See "Streets and Roads."

Illinois — Dpt. P. Wks. & Buildings, Hys., Springfield, bridge in Cook Co., to cago Heights Coal Co., Chicago Heights, 134***3 bridges in Logan Co., to Jans Schaeffer, Pekin, $40,404***2 bridges in L Co., to Ben Harrison Co., Jacksonville, $4 ***substructure bridge in Fulton and M Counties, to Wisconsin Bridge & Iron Co., North 34th St., Milwaukee, $225,325***s structure for subway structure in Mac Co., to Worden Allen Co., 20 South LaSalle Chicago, $16,180***structural steel and structure viaduct, Wabash Co., to Zimmi Bridge Co., Peoria, $28,431***structural for subway in Cook Co., to Bethlehem Co., 400 North Michigan Ave., Chicago, $36,226. Grand total $410,275. Bids Ja Noted Feb. 6, C. D.—Jan. 30, E. N.-R.

Indiana—State Hy. Dpt., Indianapolis, constructing bridge for grade crossing elimination in Jackson Co., to J. C. Jarrett & Son, $8,532 est. $9,676***bridge in Bartholomew Co., to Bergen & Bergen, Franklin, $13,8 est. $14,503***in Lafayette Co., to R. H. K Danville, $116,385 est. $123,981. Grand total $138,756. Bids Feb. 4. Noted Feb. 7, C. D.— Jan. 23, E. N.-R.

Indiana—State Hy. Comn., Indianapolis, constructing bridges in Elkhart Co., to Haines & Haines, Dowagiac, Mich., $12,829, est. $10,95 ***in Brown Co., to D. Jenkins, Terre Haute $11,254 est. $16,078***in Marion Co., to Vincennes Steel Corp., Terre Haute Rd., Vincennes, $89,262 est. $107,640. Grand total $113,345. **P.W.A.** Bids Dec. 10. Noted Nov. 27, C. D.— Dec. 5, E. N.-R.

★ **Iowa**—State Hy. Comn., Ames, to Brennan Bros., Lansing, constructing bridges in Allamakee Co. $14,970***to E. A. Wickham & Co Council Bluffs, 4 pipe, 13 corrugated metal pipe and 4 concrete box culverts in Audubon Co. $8,428; remodeling railroad underpass, Cas. Co. $6,508***to E. A. Kramme Co., Inc., Des Moines bridge in Audubon Co. $11,362***to McKenzie & Holm, Inc., Waterloo, 10 pipe and 4 concrete box culverts in Black Hawk Co. $3,502***to Kelley & Overman, Villisca, 13 concrete pipe, 14 concrete box culverts and 2 c.i. pipe culverts in Cass and Pottawattamie Counties $22,152*** to A. Melberg, Cedar Rapids, and Eberhard Constr. Co., Guttenburg, 23 concrete pipe, 54 concrete box and 3 c.i. culverts, Des Moines Co. $90,610***to A. Olson Constr. Co., Waterloo, 1 concrete box and 1 concrete pipe culvert and one I-beam overpass in Fayette Co. $16,516*** to Ben Cole & Son, Ames, 1 rein.con. box culvert, 1 rein.-con. box culvert extension and 1 rein.-con. pipe culvert in Greene Co., $1,29 ***to Christensen Bros., Sioux City, 20 concrete pipe and 10 concrete box culverts in Hamilton and Hardin Counties $21,959***2 concrete box and 2 concrete pipe culverts in Hardin Co. $2,536***to Schroyer Constr. Co., Baxter, 4 corrugated metal pipe culverts, relaying 1 old culvert, 13 rein.-con. pipe and 11 rein.-con. box culverts in Keokuk Co. $7,585***to H. Noel, Peterson, 12 concrete pipe and 11 concrete box culverts in Lyon and Osceola Counties $7,148***to G. G. Herrick, 7th and Corning Sts., Des Moines, 1 concrete pipe and 1 concrete arch culvert and one 74 ft. through girder underpass in Marshall Co. $64,962***to Fort Dodge Constr. Co., Fort Dodge, one 150x24 ft. continuous I-beam bridge in Osceola Co. $13,174 ***to Council Bluffs Constr. Co., Council Bluffs, reconstructing underpass and adding approach spans in Osceola Co. $16,489***to Snyder & Johnson, Inc., Humboldt, one 500x42 ft. deck plate girder with two 5 ft. sidewalks and 1 concrete box culvert in Polk Co. $126,039 underpass in Union Co. $38,759; 1 concrete pipe and 1 concrete box culvert, Union Co. $1,429. Grand total $476,270. Bids Feb. 18. Noted Feb. 24, C.D.

Maine—State Hy. Dpt., Augusta, Bessey Bridge, rein.-con. substructure, structural steel superstructure over St. George River, Union Co., to H. L. Goodrich, Palmyra, $33,700. **P.W.A.** Bids Feb. 19, awarded Feb. 27. Noted Feb. 28, C. D.—Feb. 6, E. N.-R.

Montana—State Hy. Comn., Missoula, constructing 4 panel 76 ft. treated timber pile trestle over Rye Creek; single panel bridge treated timber stock pass; treated timber trestle over Fern Creek; three panel 57 ft. trestle over Tin Cup Creek and corrugated metal flume on pile bends, Ravelli Co., to J. Iten, Hamilton, $17,776***standard treated timber stock pass;

†Federal Government.

bridges, etc. (Continued)

two panel 38 ft. treated stock pass; two 3 panel 58 ft. bridge; five panel 95 ft. bridge; 1 span 75 ft. treated timber bridge on concrete piers over Horde Thief Creek, Musselshell Co., to Inland Constr. Co., 3867 Leavenworth St., Omaha, Neb., $19,704***3 span 315 ft. steel, concrete bridge across north fork of Sun River; three panel 93 ft. treated timber pile trestle, across Flowerce Irrigation Canal, grading, surfacing 0.875 mi. approach roads, Lewis and Clark Co., to S. Birch Sons Co., Great Falls, $76,065***constructing five span 369 ft. concrete, steel viaduct over Great Northern R.R. on extension of 7th Ave. in Harve, to J. C. Boespflug, Miles City, $85,485. Grand total $199,030. Bids Feb. 28. Noted Feb. 21. C. D.

North Carolina—See "Streets and Roads."

Oklahoma—State Hy. Dpt., Oklahoma City, overpass in LeFlore Co., to Gaines Bros., Miami, $46,251 est. $54,001***bridge in Pushmataha Co., to J. E. Smith & Sons, Noble, $37,085 est. $38,779***underpass in Kay Co., to Standard Paving Co., 2119 East 11th St., Tulsa, $66,032 est. $75,498. Grand total $149,368. Bids Feb. 25. Noted Feb. 18, C.D

Pennsylvania—See "Streets and Roads."

★ **Pa., Pittsburgh — Allegheny Co. Authority** County Office Bldg., superstructure for Homestead high level bridge, 3,300 ft. long, 60 ft. wide, Contr. 202, and furnishing, erecting superstructure for 5th Ave. ramp, Contr. 205, to American Bridge Co., Frick Bldg., $1,080,802 and $20,196 respectively***5th Ave. & 8th Ave. abutment, incl. masonry, paving, grading, demolition buildings and changing grade, Contr. 203, and grading, paving, masonry work necessary for construction north approach, Contr. 204, to Holmes Constr. Co., Palmer St., Wooster, O., $89,654 and $149,759 respectively. Grand total $1,340,411. **P.W.A.** Noted Sept. 3, C.D.—Sept. 5, E.N.-R.

Vermont—State Hy. Dpt., H. E. Sargent, ch. engr., Montpelier, Lemon Fair Bridge, I-beam bridge with concrete floor and gravel approaches on State Hy. 2, Cornwall, to B. A. Barton Constr. Co., Inc., Vergennes, $18,915; slag bridge, corrugated galvanized multi-metal pipe culvert and gravel approaches on State Hy. 19, to Charles I. Hosmer, Inc., 87 Prospect St., Greenfield, Mass., $7,505. Bids Feb. 21, awarded Feb. 27. Noted Mar. 2, C. D.

Virginia—See "Unclassified."

Virginia—State Hy. Dpt., Richmond, bridge over Dunlop Creek, Alleghany Co., to Perkins Barnes Constr. Co., Inc., Blackstone, $69,835 ***overhead crossing and approaches Fauquier Co., to Alley Constr. Co., Inc., Bristol, $59,081 ***repairing bridge over Pamunky River, at West Point, to Tidewater Constr. Co., Norfolk, $43,350. Grand total $172,266. Bids Feb. 25. Noted Feb. 28. C.D.—Feb. 13, E. N.-R., under "Streets and Roads."

Washington—See "Streets and Roads."

Wash., Seattle—City, paving, incl. ducts for lighting Railroad Ave. from Blanchard to University Sts., to Northwest Constr. Co., 3950 Sixth St. N.W., $21,450; rein.-con. overhead pedestrian viaduct across Aurora Ave. to North 41st St., to A. S. Peterson, 4311 Whitman, $10,897. Bids Dec. 2. Noted Dec. 9, C. D.—Dec. 12, E. N.-R.

STREETS AND ROADS

BIDS ASKED

Arkansas—State Hy. Comn., Little Rock, rejected bids Feb. 27, grading, minor drainage, bituminous and gravel base course surfacing 2.4 mi. Benton Co., $40,000***concrete paving 0.8 mi. White Co., $20,000; received no bids Feb. 27, grading, drainage, traffic service gravel, 7 mi. Arkansas Co., $40,000; grading, minor drainage, bituminous and gravel base course surfacing 2 mi. Baxter Co., $40,000*** grading, minor drainage, gravel surfacing 9 mi. road at Greenbrier, extending 9 mi. east on county road to Radio, $40,000, and 1.3 mi. south city limits to point 1.3 mi. South-Route 65, $20,000, both in Faulkner Co. Noted Feb. 18, C. D.—Feb. 20, E. N.-R.

Arkansas—Mar. 19, by Highway Dpt., Little Rock, grading, drainage, rein.-con. and structural steel underpass and concrete paving 0.5 mi. East Main and Gunter Sts., on Siloam Springs connection road, Benton Co., 8,897 cu. yd. excav., $60,000; grading, drainage 8 mi. and 4 untreated timber bridges and traffic service gravel surfacing Danville-Waldron Rd., Yell Co., 14,000 cu.yd. excav., $40,000; drainage, bituminous on gravel surfacing 2 mi. Mt. Home and West Hy. 62, Baxter Co., 5,511 cu.yd. excav., $40,000; grading, drainage, bituminous surfacing 1.8 mi. Hardy East Rd. Hy. 63, Sharp Co., 6,157 cu.yd. excav., $40,000; concrete paving 0.8 mi. Beebe-McRae Rd. Hy. 67, White Co., $25,000; grading, drainage, traffic service gravel surfacing 9 mi. Greenbrier Centerville Rd., 12,388 ft. excav., $40,000; 1.3 mi. Conway South Rd., 5,646 cu.yd. unclassified excav., $25,000; rein.-con. overpass and concrete pavement approaches, 430 ft. Maple St., Washington Co., incl. 613 cu.yd. excav., $40,000; grading, traffic service gravel surfacing 0.5 mi. Palarm North Road Hy. 65, 22,900 cu.yd. unclassified excav., $25,000, all foregoing Faulkner Co. W. W. Zass, 316 Ferry St., engr.

Calif., Los Angeles—Mar. 23, by Bd. Supervs. Los Angeles Co., Hall of Records, grading, concrete paving, drains, gutters, curbs and sidewalks, 0.66 mi. Sunset Blvd., from Horn Ave. to Beverly Hills city limit, $102,000. G. W. Jones, Hall of Records Bldg., engr.

Conn., Bristol—See "Contracts Awarded."

Iowa—Mar. 17, by State Hy. Comn., Ames, paving 0.407 mi. Primary Rd. 3, at C. R. I. & P. Ry. overhead, east of Centerville, Appanoose Co., incl. 83,832 cu.yd. excav.; 0.594 mi. secondary road from University Ave. south on West Corporation line of Des Moines, Polk Co.; grading, graveling 0.246 mo. WPGS-603, secondary road, north of Farley, Dubuque Co., 35,007 cu.yd. excav.; grading for roadside improvement 3.278 mi. U. S. Rd. 161 from Iowa City Northwest, Johnson Co., 12,450 cu.yd. excav.; 11.997 mi. U. S. Rd. 161, from Linn County Line, Johnson Co., 50,382 cu.yd. excav.; 6.874 mi. U. S. Rd. 161 from Cedar Rapids south to Johnson Co. line, Linn Co., 25,259 cu.yd. excav.; graveling 8.875 mi. secondary road from Whitney north and east toward Grand Center, Monona Co. F. R. White, ch. engr.

Kansas—Mar. 20, by State Hy. Comn., at office of County Clerk, Independence, earthwork, concrete pavement, bridging, bituminous mat surfacing, culverts 41.585 mi. hys. in Bourbon, Coffey, Greenwood, Montgomery and Woodson Counties.

Kansas—Mar. 24, by State Hy. Comn., at office of County Clerk, Kansas City, bituminous mat surfacing, earthwork, storm sewers, sidewalk, gutters, concrete paving, bridging, light type surfacing, roadside improvement 96.548 mi. hys. in Marshall, Nemaha, Osage, Wyandotte, Atchison, Douglas, Jackson, Jefferson, Johnson and Leavenworth Counties.

Louisiana—State Hy. Comn., Baton Rouge, rejected bids Feb. 5, grading, gravel surfacing 7.27 mi. Quitman-Beech Springs School Hy., Routes 545 and 547, Project 1134, Jackson Parish; 4.3 mi. Intersection Route 23-Intersection Route 576 Hy., Route 575, Project 1132, Evangeline Parish. Noted Feb. 17, C. D.—Jan. 16, 23 and 30, E. N.-R.

Louisiana—Mar. 18, by State Hy. Comn., Baton Rouge, grading, gravel surfacing 5.5 mi. Bluff Creek-Sunbeam and Bluff Creek-Gilead Hys., on Routes 126 and 312, Project 1169, East Feliciana Parish.

Maryland—Mar. 17, by State Roads Comn., Baltimore, gravel-paving 2.73 mi. along Bel Alton Newton Rd. from end of Contr. 126 to Newton, Contr. 159-1-82, Charles Co.; stabilized earth surfacing 2.66 mi. along Fingerboard-Urbana Rd. from point 1 mi. west of Fingerboard to Centerville, Contr. F-269-52, Frederick Co.

Massachusetts—Mar. 24, by Commonwealth of Massachusetts, Dpt. P. Wks., W. F. Callahan, comr., G. H. Delano, ch. engr., 100 Nashua St., Boston, bituminous macadam or penolithic type paving 3.241 lin.ft. or 23,100 sq.yd. and Class 1 bituminous concrete sidewalks, Project WPMS 267, Lynn, about $50,000; bituminous concrete sidewalks and incidental work, 9,750 sq.yd. by Boston and Dedham, part of projects NRM 251-B and NRH 251-A, about $30,000; bituminous concrete sidewalks, 6,725 sq.yd. by Billerica and Chelmsford, part of NRS 253, about $15,000.

Mo., Farmington—Mar. 19, by City Clerk, grading, asphalt on macadam paving various streets, $37,500. P.W.A. project. B. F. Walther, city engr. Noted Feb. 19, C. D.—Feb. 27, E. N.-R.

†**New Mexico**—Mar. 24, by Pub. Rds., Denver, Colo., grading, drainage structures, surfacing 18.575 mi. Forest Hy. Project 37-C-3, James Canyon, Otero Co. $64,000. J. A. Elliott, Denver, Colo., dist. engr.

★ **New York**—Mar. 17, by Dpt. P. Wks., Albany, graveling, bridges on 0.31 mi. Whitney Point-Greene Rd., Part 1-A, W.P.S.X. 945-A, W.P.S.S. 896-C, Broome Co., $55,067; improving 1.96 mi. Lackawanna City-Abbott Rd. W.P.M.S. 978, Erie Co., $108,158; 0.78 mi. Mount Read Blvd., W.P.S.O. 968-A, Monroe Co., $131,136; 0.77 mi. Niagara Falls City-Whirlpool St., W.P.M.S. 963-A, Niagara Co., $86,160; roadside improvement Schodack Center-Nassau Rd., Nassau Village Rd., Nassau-Brainard Rd., Riders Mills-Brainard Rd., East Nassau-Brainard Rd., Rensselaer Co., $34,048; constructing culverts on Rd. 2, Ganungs Rd., Sherman Rd., Big Hollow Run Rd., Wasson Rd., Fasling Rd., Coon Hollow Rd., Part 3, Naltby Rd., Fletcher Hill Rd. and Pine Creek-Rd., Schuyler Co., $79,902; concrete paving and constructing bridges 0.43 mi. Perry City-Trumansburg Rd. and Mecklenburg-Ithaca Rd., Schuyler and Tompkins Counties, $98,066; granite block paving 1.28 mi. Yonkers City North and South Bway., W.P.M.H. C36-15, Westchester Co., $176,300; paving and eliminating grade crossing 2.99 mi. Hutchinson River Parkway Extension, Port Chester Crystal Springs Rd. and Merritt Parkway, Westchester Co., $769,279. Total $1,656,229.

North Dakota—Mar. 20, by State Hy. Comn., Bismarck, grading, graveling 6.918 mi. Medina West, Stutsman Co., incl. 134,072 cu.yd. excav., $79,000; 14.192 mi. Dawson Rd. East, U. S. Rd. 10, Kidder Co., 212,448 cu.yd. excav., $136,500; graveling 7.312 mi. Lignite Rd. south, Burke Co., $15,750; subgrade stabilizer 10.813 mi. Berthold Rd. north, Ward Co., $16,000; grading 6.033 mi. road east of Ruso, McLean

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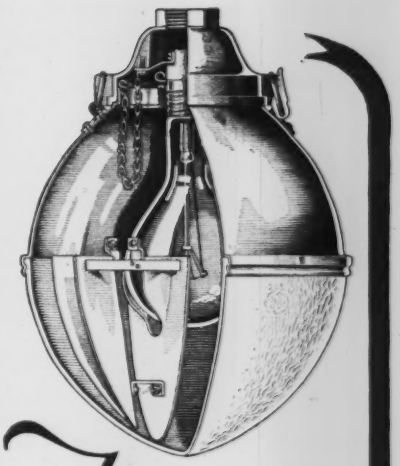
†*Federal Government.*



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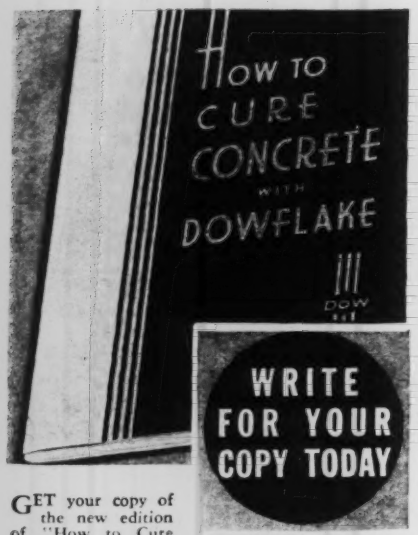

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Streets and Roads (Continued)

Co., $30,500; 6.054 mi. Carrington West Rd., Foster Co., $30,000; 3.888 mi. road west of Hanover, Oliver Co., $29,000; constructing overhead structure in New Rockford, Eddy Co., $23,000. Total $359,750. W. J. Flannigan, state hy. comr.

★ **Ohio**—Mar. 17, by J. Jaster, Jr., dir. Hys., Columbus, grading, drainage structures, rein.-con. paving and roadside improvement 3.452 mi. Dayton Springfield Rd. SH 60, SR 4, Clark Co., $142,873; 1.651 mi. Sect. L, Columbus-Wooster Rd. SH 24, SR 3, USR 36, Clinton Twp., Knox Co., Proposal 1, $76,032; 0.054 mi. Sect. J, same road, Liberty Twp., Proposal 3, $2,470; grading, drainage structures, rein.-con. paving 5.067 mi. Sect. P, same road, Liberty and Clinton Twps., and constructing Bridge No. KN 34-87, concrete, with steel beams on extended abutments, over Dry Creek and roadside improvement on same road, Proposal 2, $243,340; grading, concrete paving roadside improvement 3.036 mi. Sect. G-1, National Rd. SH 1, USR 40, Licking Co., $463,623; 1.637 mi. Sect. D-2, Celina-Wabash Rd., SH 264, SR 32, Mercer Co., Proposal 1, $60,342; 3.092 mi. Sect. D-1, same road, also constructing Bridge No. ME 32-78, concrete with steel beams over Beaver Creek, 4 mi. west of Celina, $130,507; 0.16 mi. Sect. D, Milton-Carlisle Rd. SH 198, SR 71, Miami Co., $20,106; 5.88 mi. Sect. H Van Wert Paulding Rd. SH 430, USR 127, Paulding Co., Proposal 1, $135,727; constructing Bridge No. PA 127-50, concrete steel beams over Blue Creek, Sect. H, same road, Proposal 2, $18,961; 0.096 mi. bridge on Van Wert Paulding Rd., Sect. H, same road, Proposal 3, $1,027; 0.578 mi. Sect. J-2, Shelby-Mansfield Rd., SH 436, SR 39, also constructing Bridge No. RI 39-63, concrete, with continuous steel beams at Springmills Crossing, Richland Co., Proposal 1, $96,346; 0.028 mi. Sect. J-3, same road, $1,281; roadside improvement 1.33 mi. Sect. K, Akron Cleveland Rd. SH 16, SR 8, Summit Co., $6,099; grading, drainage structures, traffic bound paving 0.814 mi. Beach City to Dundee and Reese Rds., $11,638; 0.802 mi. Winesburg-Dundee Rd., $19,123; 0.653 mi. Sect. B, Bresser Shanesville Rd., SH 588, SR 93, $22,998, all foregoing Tuscarawas Co.***grading, drainage structures, hot mixed paving, hot laid asphaltic concrete, roadside improvement 1.568 mi. Sect. G-2, Bryan Napoleon Rd., Williams Co., Proposal 1, $81,448; 0.784 mi. Sect. G-2, same road, Proposal 2, $32,367***grading, drainage structures, brick paving, road stabilized, binder soil and calcium chloride paving 1.259 mi. Sect. A, Richland Co., Sect. C, Mansfield Wooster Rd., SH 146, USR 30, also constructing concrete bridge, continuous steel beams, Ashland Co., $168,434***grading, drainage structures, stabilized base paving, roadside improvement, grade crossing elimination by constructing Bridge No. CL 74-116, concrete, on continuous steel beams, Clermont Co., $69,834***grading, drainage structures, hot mixed paving, hot laid asphaltic concrete 1.826 mi. Sect. B, part Wilmington Hillsboro Rd. SH 254, SR 73, Clinton Co., and constructing Bridge CN 73-138, concrete with deck steel plate girders, over Cowans Creek, $108,466***grading, draining, constructing road stabilized with binder soil and calcium chloride 1.742 mi. Sect. G, part Linton Twp. and Muskingum Co., on Sect. F-1, part Sect. F, in Monroe Twp. of Cambridge Coshocton Rd. SH 349, SR 76, Coshocton Co., and steel truss bridge with 2 concrete approach spans on steel beams over Wills Creek at Marquand Mills, $192,805***grading, drainage structures, brick paving 0.104 mi. Sect. F, part Richmond Rd. SH 446, SR 175, Cuyahoga Co., and constructing stone faced, spandrel filled concrete arch over branch of Euclid Creek, $69,414***grading, draining, widening, resurfacing, rein.-con. paving 1.778 mi. Sect. Sandusky, part Cleveland-Sandusky Rd. SH 3, SR 2, USR 6, Erie Co., and constructing concrete beam bridge over Pipe Creek in southeast edge city of Sandusky, $140,449***grading, drainage structures, widening, cold mixed paving, cold laid asphaltic concrete 1.59 mi. Sect. B, Gahanna Southern Rd. SH 655, SR 317, Franklin Co., and constructing concrete bridge with continuous steel beams over Big Walnut Creek at Columbus Airport, $82,074***hot mixed, hot laid asphaltic concrete or westphalt paving 0.779 mi. Sect. M, Cincinnati-Chillicothe Rd. SH 8, SR 28, USR 50, Hamilton Co., $48,726***grading, drainage structures, concrete paving 0.184 mi. Sect. Q, Cleveland-Buffalo Rd. SH 2, USR 20, Lake Co., and constructing concrete beam bridge over Arcole Creek 1¼ mi. east North Madison, $36,152*** grading, drainage structures, concrete paving approaches to viaduct over Black River and roadside improvement 0.262 mi. Cleveland Lorain Rd. SH 555, SR 254, Lorain Co., Proposal 1, $29,843; constructing deck plate girder viaduct on steel bents and towers over Black River, 0.272 mi. same road, Proposal 2, $292,623***grading, draining, sidewalks, roadside improvement 1.211 mi. Sect. N, New Lebanan, part Dayton-Indianapolis Rd. SH 28, SR 11, Montgomery Co., $8,234***grading, drainage structures, widening, rein.-con. paving 6.249 mi. Mt. Gilead Mansfield Rd. SH 334, USR 42, Morrow Co., and constructing concrete bridge over Cedar Creek, $325,810***grading, drainage structures, brick on cement base paving, and roadside improvement 4.384 mi. part Sect. D, part Sect. Ken and part Sect. Ravenna of Ken Ravenna Rd. SH 323, SR 5, in Franklin and Ravenna Twps. and cities of Ken and Ravenna and village of Brady Lake, Portage Co., Proposal 1, $493,584; 4.384 mi. same r... Proposal 3, $9,896; constructing bridge ... steel beams over Congress Lake Outlet ... east of Kent, on same road, Proposal 2, $... 436***grading, drainage structures, ... bound paving 0.505 mi. Beach City Bo... Access Rd., Stark Co., $7,648***grading, d... age structures, widening, new and salvage b... surface course paving and roadside impr... ment 2.646 mi. Sect. M Youngstown W... Rd. SH 80, USR 422, Trumbull Co., $294,... Total $3,969,827.

O., Ashtabula—See "Contracts Awarded."

O., Cleveland—Bd. Comrs, Cuyahoga Co., ... this spring paving Cedar Point Rd. from R... to Lewis Rd. $35,000; Snowville Rd., ... Dewey to Riverview Rd. $90,000. J. O. Mc... liams, Court House, engr.

O., Conneaut—See "Contracts Awarded."

Pa., Williamsport—See "Contracts Award...

Vermont—Mar. 20, by State Hy. Dpt., H. ... Sargent, ch. engr., Montpelier, crushed st... mixed in place surface course with cutb... asphalt and refined tar surfacing 0.9 mi. N... Bennington-Hoosick Falls Rd., W.P.G.S. 1 ... W.P.G.M. 183-B, Bennington and Shaftsbu... 0.3 mi. Highgate Center Rd., WPSO 201 ... Swanton; gravel mixed in place surface co... with refined tar paving 0.1 mi. Main and R... road Sts., WPMS 196-A, Milton; bitumin... macadam surface course 0.2 mi. Route 7, W... 82-G, Swanton. To exceed $50,000.

Wash., Goldendale — Mar. 20, by Klick... Co. Comm., grading, draining, surfacing 2.5 ... Goldendale-Glenwood Rd., moving 150 ft. st... span bridge with piers and wood approach... $34,000. Noted Nov. 15, C. D.—Nov. ... E. N.-R.

CONTRACTS AWARDED

Alabama—State Hy. Comm., c/o G. Scott, bituminous surfacing 6.78 mi. Jasper-Winfield Rd., to Mitchell Bros., Birmingham, $144,508.

Arizona—State Hy. Comm., Phoenix, improving 19 mi. road in Mohave Co., to N. A. Hill, Phoenix, $123,818 est. $130,000***13.1 ... in Navajo and Apache Counties, to R. C. Tanner, Phoenix, $155,757 est. $217,323***10 ... Apache Co., to Packard Constr. Co., Phoenix, $192,740 est. $240,000. Bids Feb. 23. Grand total $472,316. Noted Mar. 4, C.D.

Arizona—State Hy. Comm., Phoenix, improving Flagstaff-Fredonia Hy., WPH 95-J, to Ray Hodgman, 714 Plymouth Rd., Pasadena, Calif., $106,872. Bids Feb. 11. Noted Feb. 18, C. D. —Jan. 30, E. N.-R.

★ **California** — State Hy. Comm., Sacramento, C. H. Purcell, P. Wks. Bldg., Sacramento, grading, concrete paving and constructing rein.-con. bridge 6.8 mi. hy. between Bradley and point 6 mi. south of San Ardo, Monterey Co., and grading, crusher run base and natural rock asphalt or crusher run base and plant mixed surfacing 3.9 mi. hy. between Scotts Valley and point 1 mi. north of Santa Cruz, Santa Cruz Co., to Peninsula Paving Co., 9 Main St., San Francisco, $202,613 and $316,342 respectively ***rip rap slope protection 0.6 mi. hy. between Isleton and Walnut Grove, Sacramento Co., to Blake Bros. Co., Balboa Bldg., San Francisco, $20,862. Grand total $539,817. Bids Feb. 19, awarded Feb. 28. Noted Feb. 24, C. D.

California—State Hy. Comm., Sacramento, grading 14.5 mi. hy. between Longvale and Dos Rios, Mendocino Co., to Hemstreet & Bell, P. O. Box 550, Marysville, $341,233. Bids Feb. 13, awarded Feb. 28. Noted Jan. 28, C. D.—Jan. 30, E. N.-R.

Colorado—State Hy. Dpt., Denver, grading 2.389 mi. hy. between Lyons and Estes Park on State Hy. 66, WPSS 401-B, to W. A. Colt & Son, Lyons, $104,035***gravel surfacing 1.451 mi. hy. between Boulder and Lyons, on State Hy. 7, WPMS 417, to M. E. Carlson, 4483 Newton St., Denver, $20,867, both Boulder Co. Bids Feb. 18, awarded Feb. 22. Noted Feb. 24, C.D.

Colorado—State Hy. Dpt., Denver, gravel surfacing 6.289 mi. hy. between Salida and Canon City, State Hy. 6, F.L.H.P. 2-C, Fremont Co., to Driscoll Constr. Co., Pueblo, $197,206. Bids Feb. 17, awarded Feb. 21. Noted Feb. 24, C.D.

Connecticut — J. A. Macdonald, state hy. comr., Hartford, rolled bank run gravel surfacing 17,074 ft. hy. Bridgewater, to Innes Bros., Inc., Clay St., Thomaston, $38,257***12,740 ft. hy. New Hartford, to Oneglia & Gervasini, Inc., Casson Ave., Thomaston, $34,694***25,312 ft. hy. Ledyard and Preston, to S-K Constr. Co., Lebanon $51,191***water-bound macadam paving 11,477 ft. hy. Wood bridge, to M. A. Gammino Co., 728 Valley Rd., Providence, R. I., $82,021. Grand total $186,163. Bids Dec. 5. Noted Dec. 13, C. D.

Connecticut—State Dpt. Hys., J. A. Macdonald, hy. comr., Hartford, waterbound macadam paving 1,300 ft. Route 187, East Granby, to J. Battaglia, 737 West Main St., New Britain, $10,240***20,434 ft. Newtown, to J. Varvello, Inc., 89 Park St., New Haven, $102,889***14 ft. clear span rein.-con. bridge, Stonington, to F. D. Miller, 257 Main St., Norwich, $6,475. Grand total $119,604. Bids Jan. 13. Noted Jan. 15, C. D.

Conn., Bristol—City, rebuilding King, Pine and Red Stone Sts., and new bridge over Mine River, West Washington St., W.P.A. labor, Labor $43,000, materials $18,000. C. W. Buell, Main St., engr.

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†*Federal Government.*

Streets and Roads (Continued)

Florida—State Road Dpt., Tallahassee, 6 in. sand bituminous road mix pavement 5.404 mi. Rd. 191, between Malabar and point 5.5 mi. westerly. WPSO 181. Brevard Co., to Coastal Roads Co., Miami, $89,658. Bids Feb. 13. Noted Feb. 5, C.D.

Illinois—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, paving 0.23 mi. road in Randolph Co., to W. Lough & Sons, Marion, $26,535; 0.5 mi. Cook Co., to Contracting & Material Co., 42 East Pearson St., Chicago, $100,837. Bids Jan. 31. Noted Feb. 6, C. D.—Jan. 30, E. N.-R.

Ill., Bloomington—Dpt. P. Wks., crushed stone surfacing 12.5417 mi. Section 29 MFT, State Aid Route 12, McLean Co., to Powers Constr. Co., Normal, $33,504. Bids Feb. 15. Noted Feb. 10, C. D.

★**Iowa**—State Hy. Comn., Ames, to Wright Constr. Co., 102 Forest St., Des Moines, paving 1.064 mi. Greene Co. $38,145; 0.31 mi. Greene Co. $9,527***to G. G. Herrick, 7th and Corning Sts., Des Moines, 0.545 mi. Marshall Co. $29,825***to J. S. McLaughlin & Sons Co., 300 Liberty Bldg., Des Moines, 0.256 mi. Union Co. $27,757; 0.18 mi. Union Co. $9,500***to Specketer Constr. Co., Sioux City, grading 5.449 mi. Audubon Co. $16,085***to McKenzie & Holm, Inc., Waterloo, 2.175 mi. Black Hawk Co. $10,958***to F. P. Akin & F. Eben, Corning, 7.604 mi. Cass and Pottawattamie Counties $45,850***to R. J. Ryan, Ottumwa, 11.283 mi. Des Moines Co. $101,364***to G. H. Lowe, Cedar Rapids, 0.359 mi. Fayette Co. $13,714; 15.074 mi. Hamilton and Hardin Counties $62,329; 1.958 mi. Hardin Co. $11,797***to L. H. Holscher, Marengo, 4.689 mi. Keokuk Co. $17,603***to Green Constr. Co., 1201 Capitol Theater Bldg., Des Moines, 7.465 mi. in Lyon and Osceola Counties $37,056***to Dixon Constr. Co., Centerville, graveling or crushed stone surfacing 3.751 mi. Adair Co. $8,130*** to Baker & Patton, Cedar Rapids, 15.764 mi. Clinton Co. $17,529***to Automatic Gravel Products Co., Muscatine, 10.281 mi. Clinton Co. $11,860***to Kelley Constr. Co., Des Moines, 14.101 mi. Iowa Co. $27,920***to E. I. Clark, Des Moines, 5.7 mi. Madison Co. $7,796. Grand total $504,745. Bids Feb. 18. Noted Feb. 24, C.D.

Maryland—State Roads Comn., Baltimore, macadam paving 1.87 mi. along Smithsburg Foxville Rd., Contr. W-166-1-62, Washington Co., to Thomas, Bennett & Hunter, Westminster, $38,892. Bids Feb. 25.

Maryland—State Roads Comn., grading, drainage 2.94 mi. along Hagerstown Meyersville Frederick Rd., Contr. F-273-525, Frederick Co., to H. J. Campbell & Sons, Towson, $92,989.

★**Montana**—State Hy. Comn., Missoula, to F. H. Haas, Great Falls, graveling 0.298 mi. Kennedy Creek-Watertown Rd., $10,577*** to Inland Constr. Co., 3867 Leavenworth St., Omaha, Neb., graveling, small drains, 2 treated timber bridges in Blaine Co., $111,460***to B. Hunt, Butte, grading, road mix treating 0.147 mi. Gallatin Co., $19,581***to Poston Bros., Kalispell, bituminous treated top course paving 9.977 mi. Flathead Co., $178,668***to J. C. Maguire, Butte, concrete paving 0.993 mi. in Butte, $40,929; 0.412 mi. Wyoming St., 0.196 mi. Main St. and 0.215 mi. Great North tracks on 3rd St., in Butte, $134,187***to Nolan Bros., 18 North 2nd St., Minneapolis, Minn., graveling 4.436 mi. Lewis and Clark Co., $86,392; 19.78 mi. road in Rockville, $20,091; 5.183 mi. Madison Co., $17,939; oil surfacing 0.371 mi. in Wiboux, $4,824***to Lawler Corp., Butte, grading, bituminous treating 703 mi. road in Darby, $142,436***to M. Wunderlich, Jefferson City, Mo., 7.632 mi. Garfield Co., $112,129***to Lobnitz Bros., Libby, 11.471 mi. Sheridan Co., $132,820***to McNutt Bros., Eugene, Ore., grading, bituminous surfacing 16.049 mi. Powder River Co., $182,819***to S. G. Groves Co., 505 Wesley Temple Bldg., Minneapolis, Minn., bituminous surfacing 12.208 mi. Musselshell Co., $192,721***to Woodward Constr. Co., Billings, road mix surfacing 14.463 mi. Silver Bow and Jefferson Counties, $45,511. Grand total $1,433,184. Bids Feb. 28. Noted Feb. 21, C. D.

New Hampshire—State Hy. Dpt., Concord, 4 in. on 5 in. gravel paving 1.99 mi. Northfield, Mass. Rd., Winchester, Cheshire Co., to New Haven Road Constr. Co., 1817 Dixwell Ave., Hamden, New Haven, Conn., $92,676. Bids Feb. 6. Noted Feb. 14, C. D.—Jan. 30, E. N.-R.

New York—State Hy. Dpt., Albany, improving 0.72 mi. road in Chemung Co., to Metzger Constr. Corp., 420 Carlton St., Buffalo, $166,356 ***2.64 mi. in Onondaga Co., to Tomack Subsidiary, Inc., 67 Warehouse St., Rochester, $142,411***0.14 mi. Oneida Co., to N. D. Peters & Co., Inc., 216 Kossuth St., Utica, $51,347*** roadside improvement in Onondaga Co., to Unadilla Nurseries, Inc., Unadilla, $9,132. Grand total $369,246. Bids Feb. 11. Noted Feb. 17, C.D.—Jan. 30, E.N.-R.

★**North Carolina**—State Hy. Comn. and P. Wks. Dpt., Raleigh **(P. means Project)**, to F. D. Cline, Raleigh, grading, concrete paving, bituminous concrete surfacing, structures on hy. in Williamston, P. 1562 Martin Co. $17,976 ***to Hobbs-Peabody Constr. Co., 317 West Worthington Ave., Charlotte, structures on 6.55 mi. hy. P. 4783, Wake Co., $5,242***to Kiker & Yount, Reidsville, grading, bituminous surface treating, artificial sand clay surfacing, structures 7.67 mi. P. 164, Nash Co., $62,126; grading, Class A gravel and concrete pavement on piles 0.26 mi. P. 1732, Pasquotank Co., $33,290; structures on 5.61 mi. P. 430 Lincoln Co., $21,964; concrete paving, underpass 0.39 mi. P. 4892, Wake Co., $44,770; grading, traffic bound macadam paving 6.61 mi. P. 5970, Rockingham Co., $69,669; structures on same road, $8,503***to C. G. Fuller, Barnwell, S. C., grading, sand bituminous surfacing 11.32 mi. P. 2222 Duplin Co., $121,555***to F. A. Triplett, Chester, S. C., T. S. surfacing, overhead crossing 0.16 mi. P. 304, Wake Co., $19,090***to Wilson Constr. Co., Asheville, grading, T.S. surfacing with stone stabilizer 5.61 mi. P. 430, Lincoln Co., $48,257***to Cobb & Homewood, Chapel Hill, grading, T.S. surfacing, artificial sand clay surfacing 6.55 mi. P. 4783, Wake Co., $37,807; 0.5 mi. P. 4475, Lee Co., $22,091*** to Blythe Bros., Charlotte, concrete paving, bituminous concrete paving, structures 1.18 mi. P. 6529, Mecklenburg Co., $97,808***to Brown Paving Co., Lexington, bituminous concrete surfacing, structures 0.45 mi. P. 6750, Rowan Co., $21,835, Grand total $631,983. Bids Feb. 18. State Hy. Comn. & P. Wks., Raleigh, rejected bids Feb. 18, structures on 11.32 mi. P. [illegible], Duplin Co. Noted Feb. 25, C.D.—Feb. 13, E. N. R.

N. D., LaMoure—City, 60,000 cu.yd. bituminous oil mix surfacing, to Megarry Bros., Bismarck, $53,309. Bids Feb. 3. Noted Jan. 29, C. D.

O., Ashtabula—Ashtabula Co., relaying brick pavement with slag cushion and cement grout filler on 3 mi. Lake Shore Park Rd. from U. S. Route 20 to Lake Shore Park, near here, day labor, under supervision of E. N. Luce, Jefferson, co. engr. $35,000. **W.P.A.**

O., Conneaut—City, removal of parkway in Broad St. and replacing with concrete pavement, relief labor. $153,088.

Oklahoma—State Hy. Dpt., Oklahoma City, to Gaines Bros., Miami, grading, drainage 2.7 mi. Craig Co. $21,369 est. $22,000; 2.1 mi. Nowata Co. $15,004 est. $17,000; 1.791 mi. Osage Co. $22,337 est. $22,655***to J. E. Smith & Sons, Noble, 2.993 mi. Pushmataha Co. $23,610 est. $25,000; to Moran-Buckman, Muskogee, 2.88 mi. road in Sequoquah Co. $24,478 est. $24,928***to S. E. Evans, Fort Smith, Ark., 3.19 mi. Sequoyah Co. $53,342 est. $59,005***to D. Sweeney, 410 West 11th St., Oklahoma City, 4.78 mi. Canadian Co. $30,720 est. $39,694***to Asphlund Constr. Co., Enid, concrete paving 0.082 mi. Garfield Co. $9,597 est. $8,104***to R. S. Smith, Insurance Bldg., Oklahoma City, 1.519 mi. in Payne Co. $63,150 est. $64,796. Grand total $263,607. Bids Feb. 18, C.D.

Pennsylvania — State Hy. Dpt., Harrisburg, rein.-con. paving 0.42 mi. Route 35050, Sect. 1, Old Forge Boro, Lackawanna Co., to Union Paving Co., 1227 North Broad St., Phila., $36,661. Bids Jan. 31. Noted Jan. 21, C. D.—Jan. 23, E. N.-R.

Pennsylvania — State Hy. Dpt., Harrisburg, rein.-con. paving, rein.-con. arch, drainage and bituminous native stone surfacing 1.59 mi. Route 121, Sect. R-5, Shirley Twp., Huntingdon Co., to W. C. Gates, 1059 Pennsylvania Ave., Tyrone, $77,945***rein.-con. paving 1.52 mi. and 2 rein.-con. structures, Route 9, Sect. 5, city of Scranton, Lackawanna Co., to H. R. Miller, P. O. Box 1235, Lancaster, $118,661. Bids Dec. 20. Noted Dec. 11, C. D.

Pennsylvania — State Hy. Dpt., Harrisburg, rein.-con. paving 1.18 mi. and 2 rein.-con. structures, grading and shoulders, Route 123, Sects. 1 and 2, York Co., to Strayer & Smith, Dillsburg, $66,120***constructing Bridge 24, Washington Twp., 260 ft. timber deck 1-beam stringer, rein.-con. paving, grading for temporary bridge and approaches, Route 247, Fayette Co., to Holt, McConnell & Osburn, Inc., 30 Murdock St., Cannonsburg, $10,578***rein.-con. arch and pavement, grading and shoulders, Route 155, Montgomery Co., to E. A. Daylor, 93 South 6th Ave., Coatsville, $12,694. Grand total $89,392. Bids Dec. 27. Noted Jan. 13, C. D.—Jan. 23, E. N.-R.

Pa., Pittsburgh — See "Bridges and Grade Crossings."

Pa., Williamsport—City, bituminous resurfacing and repairing various streets wrecked by ice and snow, own forces under supervision of L. Mussina, city engr. $30,000. $15,000 appropriated by Council for materials. City Council will take bids about Mar. 15, on furnishing bituminous materials. **Maturity late in March.**

Rhode Island—Bd. Contracts, Standards and Purchases, Providence, Type "F," Class "C" mixed in place gravel pavement 1.202 mi. Buck Hill Rd., Project WPSO 124, Contr. 3520, Burrillville, to R. A. Bergerson, 442 Providence St., Woonsocket, $32,111; Type "G," Class "C" premixed bituminous surfacing 1.141 mi. Tucker Rd., Contr. 3523, Project WPSO 122, Gloucester, to John Ambrose Constr. Co., 1100 Pontiac Ave., Cranston, $29,597. Bids Feb. 10, awarded Feb. 27. Noted Feb. 18, C. D.

South Carolina—State Hy. Dpt., Columbia, earth type surfacing 4.887 mi. Route 39, WPSS 377-C, Laurens Co., to S. S. Newell & Co., Wallace Bldg., Greenville, $36,087; State Hy. Dpt., Columbia, rejected bids Feb. 4, road work and drainage structures 7.2 mi. Route 15, Sumter Co., will readvertise. Noted Feb. 10, C.D.—Jan. 30, E.N.-R.

Tennessee — State Dpt. Hys. & P. Wks., Nashville, roadside development 5.43 mi. State Hy. 15, N.R.H. 3-A, Franklin Co., to

Federal Government.

Constr. News page 175

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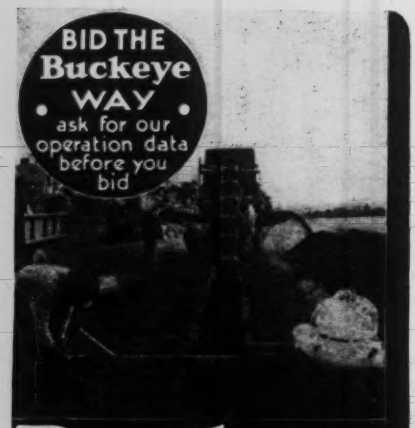

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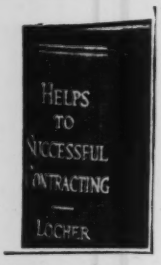

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Streets and Roads (Continued)

Morning Star Nursery, Rives, $9,751•••reconstructing 3.448 mi. State Hy. 7, F.A.P. 25, reopened, Giles Co., $9,751•••to Sam E. Finley, 292 North Ave. N.W., Atlanta, Ga., $65,378•••grading, drainage, paving 0.426 mi. State Hy. 9, N.R.M. 77-H, Campbell Co., to Polk Smartt, Inc., Slayton St., Chattanooga, Tenn., $80,932•••grading, drainage 1.64 mi. State Hy. 113, F.A.P. 283-C, Sequatchie Co., to T. M. Strider, Cotton States Bldg., Nashville, $55,965•••2.673 mi. State Hy. 50, W.P.S.S. 294-C, Lincoln Co., to Ziegler Constr. Co., 709 American Natl. Bank Bldg., Nashville, $43,324•••6.794 mi. State Hy. 50, N.R.S. 424-A, Maury Co., to J. Oman, Jr., Acklen Park, Nashville, $64,204•••4.824 mi. non-system hy., W.P.S.O. 439-A, Obion Co., to R. F. Pryor, Mayfield, Ky., $45,018•••constructing overhead and approaches over G. M. and N. R.R. 0.433 mi. State Hy. 100, W.P.G.H. 417-C, Chester Co., to Bowyer & Johnson, Jackson, $19,888••• widening, resurfacing 5.499 mi. State Hy. 1, W.M.P.H. 41, Knox Co., to Wesco Co., Riverside Dr., Chattanooga, $265,185. Grand total $649,645. Bids Feb. 28, awarded Mar. 2. Noted Mar. 4, C. D.—Feb. 20, E. N.-R.

Utah—State Rd. Comn., Salt Lake City, grading, draining, graveling 9.251 mi. road in Uintah Co., to W. W. Clyde & Co., Springville, $73,871 est. $78,818: 0.588 mi. road in Sanpete Co., to L. A. Young, Richfield, $9,129 est. $12,358. Bids Feb. 24.

Virginia—State Hy. Dpt., Richmond, grading, drainage 1.685 mi. Bath Co., to Hall & Mitchell, Keswick, $22,178•••2.366 mi. Caroline Co., to W. H. Armstrong & Co., 2700 Q St., Wash., D. C., $52,252•••0.547 mi. in Newport News, to E. P. Lindsay, Portsmouth, $17,660•••rein.-con. paving 0.069 mi. Campbell Co., to J. I. Hicks & Bros., Covington, $2,870•••paving and bridges in Farmville, to W. W. Draper & Co., Roanoke, $4,779•••0.106 mi. road in Crewe, to Perkins-Barnes Constr. Co., Inc., Blackstone, $1,004. Grand total $101,283. Bids Feb. 25. Noted Feb. 28, C. D.—Feb. 13, E. N.-R.

Washington — L. V. Murrow, dir. Hys., Olympia, grading 5.284 mi. Kittitas Co., to C. E. O'Neal Co., Inc., Stevenson, $114,522•••cold asphaltic concrete paving 1.367 mi. Thurston Co., to Warren Northwest, Inc., P. O. Box 5072, Portland, Ore., $37,522•••grading, draining, crushed stone surfacing 1.852 mi. Cowlitz Co., to Hendricks & Co., Chehalis, $17,927••• grading, draining, crushed stone surfacing 2.234 mi. Klickitat Co., to J. C. Paping, Carson, $42,250•••constructing 100 ft. treated timber trestle bents with untreated deck 0.02 mi. Asotin Co., to L. C. Fountain & Son, 636 Second St., Clarkston, $6,927. Grand total $219,148. Bids Feb. 25. Rejected bids Feb. 25, cold asphaltic concrete paving 0.26 mi. and 0.384 mi. State Rd. 21, Sixth St., city of Bremerton, U. S. Wks. Project WPMR 175-D, Kitsap Co., and 0.33 mi. road in Grays Harbor Co. Noted Feb. 13, C. D.

Wash., Colfax—Whitman Co., grading, surfacing Endicott-St. Johns Rd., incl. 24,330 cu. yd. Class A and 13,120 cu.yd. solid rock excav., to L. C. Fountain & Son, Clarkston, $28,345. Noted Feb. 24, C. D.

Wash., Seattle—See "Bridges and Grade Crossings."

EARTHWORK, IRRIGATION, DRAINAGE AND WATERWAYS

PROPOSED WORK

Ind., Bluffton—City Bd. Wks., City Hall, will purchase materials for constructing 800 ft. embankment around city light and water plant on Wabash River.

N. H., Keene—City, F. T. Trask, mayor, City Hall, preliminary plans control of flood waters of Ashuelot River. Engineer not appointed.

N. C., Winston-Salem—City plans dredging and draining Muddy Creek from Yadkin River to its forks with Salem Creek and South Fork Creek 2¼ mi. up the tributaries, channel will be widened to 50 ft. and deepened to 10 ft., approximately 600,000 cu.yd. dirt to be removed. $85,000. E. W. Cole, Winston-Salem, dist. engr. J. Rivers, dist. W.P.A. dir.

Pa., Scranton—City, Dpt. P. Wks., W. A. Schunk, dir., plans dredging Lackawanna River from Green Ridge to Brook Sts. to eliminate flood danger in lowlands. C. F. Schroeder, city engr.

BIDS ASKED

★ †**Arizona**—Apr. 6, by Bureau Reclamation, Denver, Colo., constructing Bartlett Dam, on Verde River, Maricopa Co. for Salt River Valley Water Users Assn. $4,000,000.

†**Arizona**—Apr. 7, by Bureau Reclamation, Producer Bldg., Phoenix, constructing Bartlett Dam, concrete multiple arch type, for Salt River Project, incl. 135,000 cu.yd. common and 185,000 cu.yd. rock excav. in open cut, etc., Spec. 674.

Calif., Stockton—Reclamation Dist. 524, taking bids sloping 2,300 lin.ft. river levee located about 8 mi. from here, involving 17,000 cu.yd. earth. Ohm & Raab, 109 East Weber Ave., engr.

Ind., Lawrenceburg—See "Contracts Awarded."

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Neb., Niobrara—See "Contracts Awarded."

N. Y., Brooklyn—Mar. 16, by Marine Parkway Authority, Arsenal Bldg., Central Park, New York, placing 1,850,000 cu.yd. hydraulic fill in Marine Park, Brooklyn Boro, and Jacob Riis Park, Queens Boro. Madigan-Hyland, 5th Ave., New York, consult. engrs.

†**Texas**—Mar. 31, by Bureau Reclamation, Austin, constructing Arnold Dam and power plant and processing of sand and crushed rock for Arnold and Hamilton Dams, Colorado River Project, west of Austin and near Burnet, Kingsland, incl. 20,000 cu.yd. common and 2,000 cu.yd. rock excav. in open cut, etc., Spec. 673.

Tex., Pecos—Apr. 2, by Red Bluff Water Control Dist., c/o E. B. Berron, pres., incl. Schedule Items 1 and 2, one 1,600 and one 1,200 hp., 60 ft. net effective head single runner vertical hydraulic turbine with governor system. Items 3 and 4, 175 ft. 5 ft. 6 in. and 165 ft. 6 ft. 6 in. diam. steel penstock tubes; Schedule 5, Items 1 and 2, one 1,625 kva. and one 1,200 kva., alternating current, direct-connected vertical generator with direct coupled exciter. Item 3, one remote controlled, manually operated standard open panel station type switchboard and switching equipment for control and protection of above mentioned generators, incl. three feeder panels, with necessary instruments, oil switches, etc., Item 4, three 500 kva. 2,400/33,000 volt O.I.S.C. single phase, 60 cycle and six 10 kva. 2400/110/220 volt O. I. S. C. single phase, 60 cycle transformers, Item 5, miscellaneous power house and substation control and protective equipment; Schedule 3, one 10 ton manually operated single I-beam geared crane trolley and hoist; Schedule 4, Item 1, installation of above machinery and electrical equipment complete and completion of Red Bluff substation. Item 2, completion of superstructure of power house building complete. Total est. $150,000. P.W.A. project. V. L. Sullivan, Orla, engr.

N. B., Moncton—Mar. 21, by W. V. Appleton, genl. mgr., Atlantic Region Canadian Natl. R.R., for reconstructing stone filled timber fender crib at swing span of Grand Narrows Bridge, Cape Breton Island.

CONTRACTS AWARDED

†**Arizona and California** — Bureau Reclamation, Yuma, Ariz., constructing earth lining on All-American Canal, Boulder Canyon Project, about 9 mi. from Yuma, Ariz., to D. H. Ryan, 1615 Fern St., San Diego, Calif., $99,150. Bids Feb. 6. Noted Feb. 13, C. D.—Jan. 23, E. N.-R.

†**Arizona**—Bureau Reclamation, Phoenix, altering spillway Roosevelt Dam on Salt River Project, to Dan Teters & Co., Ogden, Utah, $53,930. Bids Feb. 5. Noted Feb. 25, C.D.—Feb. 20, E.N.-R.

★ **Calif., San Diego**—City, dredging bay and additions to Lindbergh Field, involving dredging 1,900,000 cu.yd. from bay and reclaiming and adding Lindbergh Field 85 acres, and 500 ft. x 1,000 ft. for coast guard, to San Francisco Bridge Co., 503 Market St., San Francisco, $216,000•••dredging 2,000,000 cu.yd. material in San Diego Bay at foot of 28th St., to Standard Dredging Co., Central Bldg., Los Angeles, $300,000•••dredging 435,000 cu.yd. from bay at Battery Park, to Sparks & McClelland, Newport, $45,000. Grand total $561,000. P.W.A. Noted Nov. 7, C.D.—Nov. 14, E.N.-R.

Ind., Lawrenceburg—Bd. P. Wks., City Hall, H. B. Herrick, clk., constructing concrete toe wall and hand placed rip rap work, W.P.A. labor, $54,612. W.P.A. project. Soon takes bids purchasing materials.

†**Louisiana** — U. S. Eng., Prytania St. and River Front, New Orleans, dredging 420,000 cu.yd. in Lake Mongoulis Channel extension in Atchafalaya Basin, to McWilliams Dredging Co., Hibernia Bldg., New Orleans, 9.4c. per cu.yd. Bids Mar. 3.

Neb., Niobrara—State, Lincoln, river control work and construction on Niobrara River, near here, relief labor. $175,000. W.P.A. allotment approved. A. D. Moore, Union Terminal Bldg., Lincoln, W.P.A. dir. will purchase materials.

†**Oregon and Idaho**—Bureau Reclamation, Ontario, Ore., earthwork, concrete lining, structures on Locket Gulch Wasteway Channel, Mitchell Butte Div., Owyhee Project, to J. Klug, Nyssa, $20,521. Bids Feb. 4. Noted Feb. 11, C.D.

†**Texas**—U. S. Eng., Galveston, repairing outer end of east jetty at Sabine Pass, to L. F. Alexander Co., Audubon Bldg., New Orleans, La., $172,640. Bids Feb. 19. Noted Mar. 5, C.D.—Jan. 30, E.N.-R.

†**Texas**—Bureau Reclamation, Austin, clearing Buchanan Dam Reservoir near Burnett, Colorado River Project, to Brown & Root, Inc., 708 Colorado St., Austin, $323,350. Bids Feb. 3, awarded Feb. 28. Noted Feb. 11, C.D.—Jan. 23, E.N.-R.

Tex., Corpus Christi—R. King, chn. Navigation & Canal Comrs., Guggenheim Cohn Bldg., creosoted timber oil dock, location near turning basin, 110 ft. long, 30 ft. wide, to Dodds & Wedegartner, 382 North Bowie St., San Benito, $25,910. Bids Feb. 7, awarded Feb. 20. Noted Feb. 28, C.D.

†**Tex., Port Bolivar**—U. S. Eng., Galveston, dredging turning basin in channel, to Jacobson, Sweeney & Jacobson, 2311½ Avenue C, Galveston, $9,250. Bids Feb. 14. Noted Feb. 28, C.D.—Feb. 6, E.N.-R.

†*Federal Government.*

Earthwork, etc. (Continued)

B. C., New Westminster—Secretary Dpt. P. Wks., Ottawa, Ont., 520,000 cu.yd. dredging North Arm of Fraser River, to B. C. Bridge & Dredging Co., 510 West Hastings St., Vancouver, $74,942. Est. $75,000. Bids Feb. 11. Noted Jan. 29. C.D.—Feb. 6. E.N.-R.

UNCLASSIFIED

PROPOSED WORK

Calif., Los Angeles—ELECTRIC SYSTEM—Bd. Water & Power Comrs. authorized expenditure of $247,770 power revenue funds for extensions and betterments to city's electric system, work at receiving station, 96th St. and Central Ave., Los Angeles terminus of Boulder power transmission line.

Calif., Springville — SWIMMING POOL — Tulare-Kings Counties Joint Tubercular Hospital, Springville, plans rein-con. swimming pool. Funds now being raised. $2,000 available. Engineer not appointed.

Conn., Litchfield — TRANSMISSION LINES, etc.—Litchfield Electric Light & Power Co., North St., plans transmission line, service connections improvements and construction. $35,000. Private plans.

Mass., Revere — BOARDWALK — Commonwealth of Massachusetts, Metropolitan Dist. Comn., W. E. Whittaker, secy., 20 Somerset St., Boston, Mass., making plans 80 ft. concrete boardwalk from Eliot Circle to Revere St., along Revere Beach Blvd. $150,000.

Mass., Scituate—PIER—Town, Bd. Selectmen, Town Hall, plans rebuilding town pier. $30,000 appropriated for same.

Mass., Springfield—CHIMES TOWER—Hillcrest Park Cemetery, 1387 Main St., plans limestone chimes tower, concrete found., 75 ft. high, at Hillcrest Cemetery. Est. about $80,000. H. G. White, 496 Bridge St., engr.

Mass., Williamstown—ATHLETIC FIELD—Williams College, W. E. Hoyt, treas., plans concrete, brick, steel, stone indoor athletic field, incl. hockey arena, baseball cage, track and football field. $100,000.

Mass., Worcester—BASEBALL FIELD, etc.—Assumption College, Rev. R. Martel, dean, 5 Assumption Ave., making plans baseball field and stands. To exceed $23,000. A. J. Ray, 39 Dartmouth St., archt. **Maturity this fall.**

Mich., Bad Axe—POWER TRANSMISSION LINE—Detroit Edison Co., 2000 Second Blvd., Detroit, preparing plans 25 mi. electric power transmission line, incl. line from Minden City to Forestville and in vicinity of Bad Axe in Huron and Sanilac Counties, wood pole lines with aluminum conductors. $25,000. Private plans.

Minn., Minneapolis—SWIMMING POOL—Bd. Educ., G. W. Womrath, bus. supt. Bd. Educ., plans furnishing materials and constructing swimming pool in Dowling School for Crippled Children. $50,000. Bd. Estimate & Taxation authorized sale of $15,000 bonds as city's share of project.

★ **Nebraska**—RURAL ELECTRIFICATION — Burt County Rural Public Power Dist., Tekamah, plans constructing rural electrification in Burt Co. $400,000. Will apply for R.E.A. loan. Henningson Eng. Co., 326 Union State Bank Bldg., Omaha, engrs.

New Mexico—AIRPORTS—Town of Deming plans municipal airport, $16,050; Town of Hot Springs plans airport, $15,975; Town of Las Vegas plans airport additions, power and communication lines, lighting system, runways and attendents quarters, $20,708. W.P.A. project.

N. Y., Brooklyn—PUBLIC BATHS and POOL—City, Dpt. P. Buildings & Public Baths, Municipal Bldg., New York, plans by W. P. Hennessey, Municipal Bldg., New York, altering and fuel oil heating equipment for public baths and pool, 139 Huron St., Est. about $37,000.

N. Y., Buffalo—SWIMMING POOL—City, City Hall, plans constructing large rein.-con. swimming pool in Walden Dist. To exceed $23,000.

N. Y., Mineola — RACE TRACK — Roosevelt Field, Inc. applied to Hempstead Town Bd., Hempstead for permit to construct automobile race track, at eastern end of Roosevelt Flying Field.

N. Y., New Rochelle — TRACT DEVELOPMENT—See "Commercial Buildings."

★ **N. Y., New York**—SEAPLANE BASE—Dpt. Docks, Pier A, Battery Pl., New York, plans constructing seaplane base, incl. 4 amphibian platforms, ramps, depot, restaurant, etc., 23rd St. and East River. $700,000. **Maturity later.** Private plans.

†**North Carolina**—POWER LINE—Rural Electricity Authority, Wash., D. C., plans constructing power lines from Moyock to point 2 mi. below Conyock. $35,000.

N. D., Sioux Falls—AIRPORT—City, A. Norstad, aud., plans constructing improvements at airport, incl. new hangar, new runways and field lighting system. $200,000. R. E. Bragstad, city engr.

O., Canton—STADIUM—Bd. Educ. making plans constructing athletic stadium, Fulton Rd. N.W. $150,000. W.P.A. project. Materials necessary will cost about $60,000. C. E. Firestone, Cleveland Ave. N.W., archt.

★ **O., Dayton**—AIRPORT—City, F. O. Eichelberger, mgr., making plans, airport incl. 150,000 sq.yd. concrete runways, lighting equipment, building repairs, drainage, fencing, $700,000 plus. Project approved, H. J. Derivan, dir. W.P.A. G. F. Baker, city engr.

Pa., Reading—AIRPORT—City plans municipal airport on Shearer-Althouse tract in Bern Twp., incl. clearing, grading land, constructing runways, hangars, administration building, lighting system. $425,000. W.P.A. project. E. Clinton Weber, city engr.

R. I., Providence—STADIUM—City, P. Wks. Comn., voted not to build municipal stadium at Hendricksen Field. $200,000. I. S. Gorman, City Hall, city archt.

Texas—RAILWAY IMPROVEMENTS—Port Isabel and Rio Grande Valley R.R., Brownsville and Pt. Isabel, preliminary plans improvement to Physical properties of railway, rebuilding roadbed, replacing steel rails, Diesel passenger and express cars, also some bridging, etc., between Brownsville and Pt. Isabel. $257,618. Private plans. Application made to Interstate Commerce Comn.

Texas—TANK FARM—Amerida Petroleum Corp., Melon, plans erecting number of steel tanks, 55,000 to 80,000 bbl. capacity on 50 acre tract of land recently purchased north of here. Some pipe purchased but other pipe for running main lines to tanks will be purchased and laid. Privated plans.

Tex., Corpus Christi—PIPE LINE—Crude Oil Pipe Line Co., Corpus Christi and San Diego, preliminary surveys, etc., building feeder pipe lines to fields in vicinity of Corpus Christi, these will be connected with main line of company now under construction between Govt. Wells Dist. in Duval Co. to Corpus Christi, probably 5½ in. welded steel. Interested contractors should get in touch with owners soon.

Tex., San Antonio—POWER LINES—H. B. Tennant, et al, Bergs Mill, San Antonio, plans erecting power lines radiating from power plant, 10 mi. circuit around Bergs Mill. Application to Bexar County Commissioners has been made. H. B. Tennant, c/o owner, engr.

Tex., San Antonio—DAM—Bexar Co., c/o M. G. Bardwell, co. park dir., starting surveys for building retention dam to form a lake in park of 5,300 acres located north of city on Hy. 66, steam shovels would be used in removing earth and dirt would be used for dam embankment. W. S. Goodman, San Antonio, co. engr. State Park Eng. Bd., engrs.

Tex., Temple — POWER LINES, etc. — Belfall's Light & Power Co., Temple, plans power and distribution project, incl. purchase and installation of Diesel-powered generating plant at Temple, 300 mi. of above-ground power distributing lines, in Bell, Milam and Falls Counties. $452,000. Allotment made by Federal Rural Electrification Administration.

★ **Utah** — TELEPHONE IMPROVEMENTS — Mountain States Telephone & Telegraph Co., 56 South State St., Salt Lake City, plans improvements and changes in system throughout state. $800,000. C. A. Alston, mgr.

Va., Amelia—GRAIN STORAGE—Garrett & Townes, Amelia, plans constructing grain storage. $37,000. **Maturity indefinite.** Architect not appointed.

Washington—SNOWSHEDS—State Legislature will be asked in 1937 to appropriate funds for constructing 3,600 ft. strongly built frame and rein.-con. snowsheds to protect Snoqualmie Pass Hy. for State Hy. Dpt., Olympia. $400,000. L. V. Murrow, Hy. Dpt., Olympia, engr.

Wyoming — OIL PIPE LINE — Illinois Pipe Line Co., Robinson, Ill., making preliminary surveys 40 mi. 8 in. oil pipe line between Lusk and Fort Laramie. To exceed $23,000. Private plans.

Wyo., Gillette—GAS SUPPLY LINE—R. G. Frye, c/o City Clerk, Gillette, received 50 yr. franchise and plans constructing natural gas line to supply town with natural gas. $100,000.

Ontario—POWER LINE—Ont. Hydro-Electric Power Comn., Toronto, plans constructing power line from Owen Sound to Annan and Leith, also line from Kilsyth to Desboro.

B. C., Campbell River — WHARF — Frank Gagne, Campbell River, soon takes bids constructing wharf. $30,000.

N. S., Sydney — WHARF — S. E. Muggah, mayor, making plans constructing extension to wharf. $100,000.

Ont., Niagara Falls—DAM—Canadian Niagara Power Co. preparing plans constructing concrete dam in Niagara River. $200,000. Noted Jan. 16. C. D.—Jan. 23. E. N.-R.

Ont., Oshawa — HYDRO-ELECTRIC DEVELOPMENT—Ontario Hydro-Electric Power Comn., T. S. Lyon, chn., Toronto, will ask the Federal Govt. to turn over Trent Valley Power System to Province of Ontario. Water in Trent Valley could be used to produce 100,000 hp.

Que., Sherbrooke—LIGHTING SYSTEM—Municipality plans by Thomas Tremblay, ornamental street lighting system.

BIDS ASKED

Ariz., Globe—GRANDSTAND—See "Contracts Awarded."

Conn., Greenwich—GAS SYSTEM IMPROVEMENTS—See "Contracts Awarded."

Conn., Hartford—DISTRIBUTION SYSTEM—See "Contracts Awarded."

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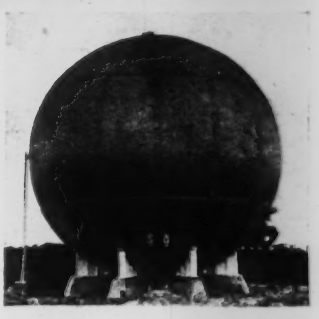
†Federal Government.

PRESSURE GASHOLDERS

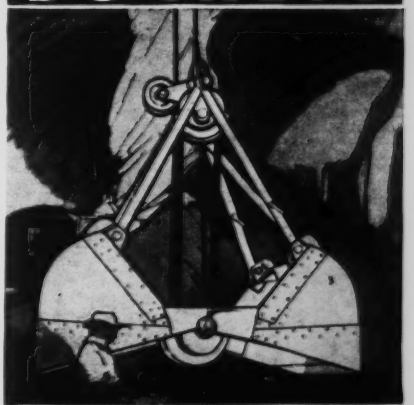


Spheres or Bullets (cylindrical containers with hemispherical ends, either vertical or horizontal)—field erected, or shop assembled—for storage of gas or volatile liquids under pressure—riveted or welded construction—welding by shielded arc process.

Pittsburgh DES MOINES STEEL COMPANY

3414 Neville Island, Pittsburgh
915 Tuttle St., Des Moines

ROPE-REEVE POWER-WHEEL LINK-TYPE BUCKETS



Capacities: ½ to 15 Yards for All Kinds of Light or Heavy-duty Service.

INDUSTRIAL BROWNHOIST
BAY CITY, MICHIGAN
New York, Philadelphia, Cleveland, Chicago
Agents in principal cities

Unclassified (Continued)

Conn., New Britain—GOLF COURSE—See "Contracts Awarded."

†Mass., Lawrence—AIRPORT—See "Contracts Awarded."

†Mo., Windsor—FENCE—Mar. 24, by Treas. Dpt. at office Sup. Archt., Wash., D. C., furnishing, installing chain link fence for U. S. Post Office.

New Jersey—ELECTRIC DISTRIBUTION—See "Contracts Awarded."

N. Y., Binghamton—RURAL ELECTRIFICATION—See "Contracts Awarded."

N. Y., Brooklyn—RECREATION BUILDING, etc.—See "Contracts Awarded."

N. Y., Leon — GAS DEVELOPMENT — See "Contracts Awarded."

New York—TUNNEL—Mar. 31, by Port of New York Authority, 111 8th Ave., New York, F. C. Ferguson, chn., constructing New Jersey ventilation building for Midtown Hudson Tunnel. Contr. MHT-11. P.W.A. project.

N. Y., New York—RECREATION BUILDING, etc.—See "Contracts Awarded."

O., Cleveland—GRANDSTAND—Parade of the Year Pageant for Great Lakes Exposition bids about Mar. 12, for steel, concrete grandstand, $40,000. Osborn Eng. Co., 7016 Euclid Ave., engrs.

O., Conneaut — PARK — See "Contracts Awarded."

Pa., Altoona — AIRPORT — See "Contracts Awarded."

Pa., Clarion — AIRPORT — See "Contracts Awarded."

†Tex., El Paso—ELECTRIC DISTRIBUTION, etc.—Mar. 19, by Con. Q.M., William Beaumont General Hospital, El Paso, extending electric distribution and lighting systems, also transformer vaults.

Tex., Marfa—NATURAL GAS SYSTEM—Mar. 28, by City, c/o H. A. Coffield, mayor, butane air gas plant, 22x32 ft. fireproof building, mixing plant, gas mains, services and supplies and equipment, incl. 6,300 ft. 4 in., 8,000 ft. 3 in. and 34,000 ft. 2 in. steel pipe, 2 sets pipe dies for ¾ to 2 in. pipe, 1 portable welding machine, 200 amp. capacity, 1 truck ¾ ton capacity, pickup, with complete equipment. $63,000.

Virginia—RAILROAD, etc.—See "Contracts Awarded."

Wash., Port Angeles—AIRPORT—See "Contracts Awarded."

Wash., Pullman—STADIUM GRANDSTAND—Mar. 20, by Bd. Regents Washington State College, constructing stadium. $110,000. S. A. Smith, Pullman, archt. Noted Mar. 3, C. D. —Mar. 5, E. N.-R.

CONTRACTS AWARDED

Ariz., Globe — GRANDSTAND — City, constructing grandstand, dressing rooms, bathrooms, administration office, at School Hill Park, relief labor. $27,533. School Dist. 1 voted $7,000 bonds for same. Noted Jan. 3, C. D.—Jan. 11, E. N.-R.

Calif., San Francisco—STREET LIGHTING SYSTEM—Dpt. P. Wks., City Hall, J. J. Casey, city engr., street lighting system, incl. 54 luminaries with compensators, fifty-four 6,000 lumen, 20 ampere Mazda street series lamps, 4 concrete foundations for standards, 9,000 ft. 14 in. conduit, 20,000 ft. 5,000 volt single conductor, AWGR and L wire, 636 extra stubs in foundations, to G. F. Brayer, 160 10th St., $11,887. P.W.A. Bids Feb. 14, awarded Feb. 27. Noted Feb. 24, C. D.

Calif., San Francisco—STREET LIGHTING SYSTEM—P. Utilities Comn., City Hall, installing eleven 20 ft. standards (furnished by city), and furnishing, installing one 16 ft. 12 luminaries with standard lamps, constructing 12 foundations and furnishing, installing conduit, wires, cables and appurtenances in Turk St. and Arguello Blvd., to R. Flatland, 1899 Mission St., $2,389. Bids Feb. 4, awarded Feb. 27. Noted Feb. 13, C. D.

Conn., Greenwich—GAS SYSTEM IMPROVEMENTS—Greenwich Gas Co., 253 Greenwich Ave., gas system improvements, here and vicinity, day labor and separate contracts. Est. $45,000. Private plans. Noted Feb. 25, C. D. —Feb. 27, E. N.-R.

Conn., Hartford—DISTRIBUTION SYSTEM—Hartford Electric Light Co., 266 Pearl St., improvements to distribution system, day labor and separate contracts. To exceed $300,000.

Conn., New Britain—GOLF COURSE, etc.—City, P. Wks. Dpt., Barbour St., golf course, constructing drives, grubbing, cleaning, improving brooks, $63,093; improving city property at Vincent Ave. and Roxbury Rd., $22,039. W.P.A. labor, P. Wks. Dpt. G. Molleur, City engr.

Kan., Kansas City — TRANSMISSION CONDUIT CABLE—City, furnishing 5,000 ft. copper transmission cable for conduit on 7th St. bridge across Kaw River, to General Cable Co., 420 Lexington Ave., New York, $43,000. Est. $50,000. C. E. Peterson, City Hall, engr. Noted Feb. 18, C. D.—Feb. 20, E. N.-R.

Louisiana—OIL PIPE LINE—Continental Oil Co., Ponca City, Okla., constructing 44 mi. 18 in. oil pipe line from Tepetate oil field to Lake Charles, to Apex Constr. Co., 2nd National

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Bank Bldg., Houston, Tex., $425,000. Est. $450,000. Awarded Feb. 15. Noted Feb. 24, C. D.—Feb. 27, E. N.-R.

†Mass., Lawrence — AIRPORT — Dpt. Commerce, Airway Div., H. F. Law, div. administrator, 425 Park Sq. Bldg., Boston, airport improvements, incl. new runways, grading, filling, lighting, etc., day labor. **W.P.A.** $190,000. **Owner will purchase material.**

Mich., Detroit — POWER LINES — Public Lighting Comn., L. J. Schrenk, genl. supt., 174 East Atwater St., installing 73,000 lin.ft., 250,000 C.M., 24,000 volt power cable and 23,000 ft. 2/0 24,000 volt power cable, to James Sugden Co., 126 Worcester St., Boston, Mass., $30,867. **P.W.A.** Noted Jan. 27, C. D.—May 30, E. N.-R.

Mo., St. Louis—ZOO—City, Bd. P. Service, City Hall, general contract constructing barless animal pits, Camel Unit 1, Houses 1-A and 1-B, Goat Unit 2, Houses 2-A and 2-B, Hoofed Animal Unit 3, Houses 3-A and 3-B, concrete, to Smith-Cooke Constr. Co., 4829 Easton Ave., $26,799***plumbing, to Arthur Maier Plumbing Co., 3653 Gravois St., $3,587***electrical work, to S. C. Sachs, Inc., 817 North 9th St., $2,790. Grand total $33,176. **P.W.A.** Bids Feb. 21. Noted Mar. 2, C. D.—Feb. 6, E. N.-R.

★ **New Jersey**—ELECTRIC DISTRIBUTION—Public Service & Electric & Gas Co., 80 Park Pl., Newark, improvements to electric distribution, incl. placing of lines underground, day labor and separate contracts. $2,000,000. Private plans.

New York — TUNNEL — Cauldwell Wingate Co., general contractors, 101 Park Ave., New York, structural steel for ventilation building, Midtown Hudson Tunnel, between New York, N. Y., and Weehawken, N. J., for Port of New York Authority, 111 8th Ave., New York, to Bethlehem Steel Co., Bethlehem, Pa. Noted Feb. 4, C. D.—Feb. 6, E. N.-R., under "Contracts Awarded."

N. Y., Binghamton—RURAL ELECTRIFICATION—New York State & Electric Corp., Binghamton, electrification in rural districts in vicinity of here, by own forces. To exceed $150,000. Private plans.

N. Y., Brooklyn—RECREATION BUILDING, etc.—Park Dpt., Arsenal Bldg., Central Park, New York, constructing 1 story, brick recreation building and comfort station, Colonial Rd., opposite 67th St., relief labor. To exceed $24,000. A. Embury, 2nd, c/o owner, archt.

N. Y., Leon — GAS DEVELOPMENT — Belmont Quadrangle Drilling Co., J. B. Cleaves, secy., P. O. Box 373, Bradford, Pa., developing new natural gas fields in Leon Twp., incl. drilling three 700 ft. and three 800 ft. wells, separate contracts. $300,000. Owner will purchase pipe. Noted Feb. 6, C. D.—Feb. 13, E. N.-R.

N. Y., New York—BASEBALL PARK—Yankee Stadium, River Ave. and 157th St., new concrete bleachers and ball park alterations, to Leopold Neckermann, Inc., 205 East 42nd St. Awarded Feb. 24. Noted Feb. 21, C. D.—Feb. 27, E. N.-R.

N. Y., New York—RECREATION BUILDING, etc.—Dpt. Parks, Arsenal Bldg., Central Park, constructing recreation building and comfort station, 1st Ave. near 111th St., Thomas Jefferson Park, relief labor. Est. about $23,000. A. Embury, 2nd, c/o owner, archt.

O., Cleveland—RAILS—See "Materials and Equipment."

O., Conneaut—PARK—City, improvement of Lake View Park, incl. drivewalks, sidewalks, fountains, pools, terraces, relief labor. $33,480. City will purchase $12,131 materials. **Maturity at once.**

Pa., Altoona—AIRPORT—City, W. H. Bair, clk., preliminary plans completed Stutz Field, SR220, near here, grading, draining, hangar, 80x100 ft., 3 runways, 100x2,100 ft., and 100x500 ft., and 100x2,670 ft., relief labor. $167,000. Owner will buy materials. Noted Feb. 14, C. D.—Feb. 20, E. N.-R.

Pa., Clarion—AIRPORT—Boro. W. B. Edwards, secy., airport improvements, grading, draining, runways, lighting systems and hangars, relief labor. $160,000. Owner buys materials.

Tex., Kilgore—SWIMMING POOL—City, tentatively awarded contract 60x275 ft., rein.-con. municipal swimming pool, 2- to 9-ft. deep, to Smith Bros., Kilgore, $23,587. A. P. Noyes, Henderson, engr.

★ **Virginia** — RAILROAD, etc. — Norfolk & Western R.R. Co., W. P. Wiltsee, ch. engr., Roanoke, constructing storage yard with 9 new tracks and extending 20 tracks and overhead bridge in Roanoke, $3,000,000; additional engine facilities at New Buchanan County Branch Line; extending tracks at Williamson, W. Va., and purchasing 131 lb. rails for replacement purposes, day labor and separate contracts. Total $5,000,000.

Va., Richmond—STEEL RAILS—See "Materials and Equipment."

Wash., Port Angeles—AIRPORT—Clallam Co., clearing, grading, draining field, 1,250x3,750 ft., graveling two 300 ft. wide lighted runways, building 60x60 ft. hangar, relief labor under direction of H. Pollock, county engr. $80,779. Materials to be bought by E. M. Quinn, State Procurement Officer, Alaska Bldg., Seattle.

MATERIALS AND EQUIPMENT

PROPOSED WORK

†PUMPS—**Los Angeles, Calif.**—U. S. F. 751 South Figueroa St., Los Angeles, rejects bids Jan. 20, constructing 1 electric motor driven and 2 natural gas engine driven water pumps. Noted Feb. 4, C. D.

ROAD OIL—**Los Angeles, Calif.**—A. J. Holm, city purch. agt., City Hall, furnishing road oil in such quantities as may be required from date of contract from June 30, Spec. 3474. Petrol Corp., 4020 Bandini Blvd., $10.50 and $10.80 per ton as required. Bids Feb. 10, awarded Feb. 27. Noted Feb. 21, C. D.

VIBRATING SCREEN—**Los Angeles, Calif.**—A. J. Holm, city purch. agt., City Hall, receives contracts for furnishing 1 vibrating screen, Spec. 3467. No decision made to readvertise for bids. Noted Feb. 28, C.D.—Mar. 5, E.N.-R., under "Contracts Awarded."

CAST IRON PIPE—**Kansas City, Kan.**—City soon takes bids furnishing 1,500 ft. 12 in. cast pipe for waterworks. To exceed $1,000.

FIRE TRUCK—**Gorham, Me.**—Town F. Small, clk., Town Hall, plans purchasing new fire truck. $6,500.

GRANITE BLOCKS—**Baltimore, Md.**—City rejected bids Feb. 19, redressing granite blocks at various city yards. Noted Feb. 26, C. D.—Mar. 5, E. N.-R.

FIRE TRUCK—**Lincoln, Mass.**—Town, Fire Dpt., plans purchasing fire truck. $2,200 appropriated.

TRUCK, etc.—**Marlboro, Mass.**—City, C. A. Lyons, mayor, supt. Streets, F. Granger, City Hall, plans purchasing one 5 ton truck with snow removal equipment, $8,000; one street grader with diesel engine, $5,700; one air compressor, $2,400; one snow and gravel loader, $5,000; three two ton trucks, $3,000, approved in city budget.

LADDER TRUCK, etc.—**Marshfield, Mass.**—Town, Bd. Selectmen, plans purchasing ladder truck and pumper. $7,000 appropriated for same.

ROAD OIL, etc.—**Monson, Mass.**—Town, H. L. Carew, chn. Bd. Selectmen, Town Hall, plans purchasing road oil and tar. $3,500 appropriated.

TRACTOR—**Orange, Mass.**—Town, C. H. Stevens, chn. Bd. Selectmen, Town Hall, appropriated $5,000 for purchase of tractor.

SNOW REMOVAL EQUIPMENT—**Winchendon, Mass.**—Town, F. E. Morelock, chn. Bd. Selectmen, Town Hall, plans purchasing snow removal equipment. $7,500.

SNOW REMOVAL EQUIPMENT—**Fairmount, Minn.**—Martin Co., W. M. Canfield, aud., plans purchasing snow removal equipment. C. N. Krosch, co. hy. engr.

TRUCK — **Halstead, Minn.** — Village, A. Opgrand, clk., plans purchasing truck for fire-fighting purposes and street work.

SNOW PLOW EQUIPMENT — **Little Falls, Minn.**—Morrison Co., L. J. Billstein, aud., plans purchasing snow plow equipment (power operated). J. E. Viner, co. engr.

SNOW PLOW—**Marshall, Minn.**—Lyon Co., B. Foss, aud., plans furnishing 1 rotary type snow plow unit (power operated). $3,000-$4,000. H. Bussard, co. hy. engr.

SNOW PLOW—**Redwood Falls, Minn.**—Redwood Co., I. R. Rogers, aud., plans purchasing one rotary snow plow (power operated). $4,000.

TRUCK CHASSIS—**Rochester, Minn.**—City, Lillian R. Sveom, clk., plans purchasing 1 truck chassis for street flusher.

STEAM TURBINE, etc.—**Kansas City, Mo.**—Kansas City Star, C. F. Dew, ch. engr., 18 Grand Ave., plans purchasing steam turbine and rotary pump, capable of pumping 500 gal. water per min.

TANKS—**St. Louis, Mo.**—E. F. Eichorn, 2710 University St., granted permit to install one 1,000 gal. underground steel tank for gasoline, 2710 University St.

TANKS—**St. Louis, Mo.**—E. Kapros, 409 South 14th St., granted permit to install two 1,000 gal. underground tanks for gasoline, 409 South 14th St.

STEEL TANK, etc.—**Buffalo, N. Y.**—Moran Transportation Co., 22 Roseville St., plans installing 550 gal. steel tank and electric pump at 22 Roseville St. To exceed $1,000.

TANKS—**Geneva, N. Y.**—R. Baroddy, Lyons Rd., plans purchasing 500 gal. steel tanks, pumps, etc., for installation in gasoline service station, recently destroyed by fire. To exceed $1,000.

FIRE TRUCK, etc.—**Hastings-on-Hudson, N. Y.**—Village plans purchasing fire truck with pumper. $10,000. E. Krows, fire comr.

PIPE, etc.—**Lakewood, N. Y.**—Village Bd., Village Hall, plans purchasing 1,550 ft. 4 in. and 2,130 ft. 2 in. c.i. pipe, fittings, etc., for watermain extensions. To exceed $1,000. H. A. Sales, village clk.

SNOW FIGHTING EQUIPMENT — **Rome, N. Y.**—City, City Hall, plans purchasing snow fighting equipment, street cleaning machine, heavy duty truck and 2 prowl cars. Will finance

†*Federal Government.*

Materials, etc. (Continued)

by bond issue. Public hearing Mar. 2. R. P. Wilson, comr. P. Wks.

PORTLAND CEMENT, etc.—**Silver Springs, N. Y.**—Village, G. L. Ribaud, mayor, plans purchasing Portland cement, gravel, sand and other materials for sidewalk extension and repair program, $2,200. **Maturity early in summer.**

GASOLINE STORAGE TANK — **Tuckahoe, N. Y.**—H. R. Charlton, Bronxville, plans purchasing steel tank for service station at Lincoln and Columbus Aves. To exceed $1,000.

TANK—**Tuckahoe, N. Y.**—A. Levine, Tuckahoe, plans purchasing steel gasoline storage tank for service station at Lincoln and Columbus Aves. To exceed $1,000.

SEWER PIPE—**Utica, N. Y.**—J. B. Shaw, city engr., plans purchasing sewer pipe for Miller St. Sewer, for City. To exceed $1,000. Owner will construct with own forces.

ASH CAR LOCOMOTIVE — **Cleveland, O.** — City, F. Milton, purch. agt., soon takes bids for ash car locomotive.

★RAILS, etc.—**Cleveland, O.**—Erie R.R. Co., Midland Bldg., F. E. Driscoll, purch. agt., in charge, plans $1,100,000 program for purchasing rails and track materials.

SNOW PLOW, etc. — **Catasaqua, Pa.** — Boro plans purchasing snow plow, for attachment to highway truck, fire hose, rubber gloves, helmets and other fire fighting equipment. To exceed $1,000.

CAST IRON PIPE—**Franklin, Pa.**—City plans purchasing $2,000 worth 6 in. c.i. pipe, fittings, for watermains extension. $2,000. **Maturity soon.** J. Snow, city engr.

DIESEL ENGINE—**Plankinton, S. D.**—City, J. E. Germann, aud., furnishing, probably installing one 225 hp. Diesel engine at municipal electric power plant. $20,000.

WIRE — **Tacoma, Wash.** — City Light Dpt., City Hall, soon takes bids for carload of copper wire. $8,000 funds appropriated. C. D. Forsbeck, City Hall, engr.

TANKS—**London, Ont.**—Shell Oil Co., 21 Dundas Sq., Toronto, plans erecting three 15,000 gal. storage tanks at distribution plant, Bathurst St.

BIDS ASKED

†TWIST DRILLS—**Wash., D. C.**—Mar. 23, at office General Purchasing Officer, Wash., D. C., twist drills, adjustable pipe dies, pressure reducing valves, bibb cocks, stop cocks, basin traps, bath plugs, etc.

†LUMBER — **Fort Williams, Me.** — Mar. 16, by Con. Q.M., Fort Williams, 20,000 ft. BM lumber and 200 pcs. wallboard, Circular 65. To exceed $1,000.

LUMBER—**Baltimore, Md.**—Mar. 18, by Bd. Awards, furnishing, delivering lumber to Dpt. P. Wks. Hys. Engineer, Municipal Bldg., engr.

BATTERY MATERIALS — **Boston, Mass.** — Mar. 16, by City, Dpt. School Buildings, 11 Beacon St., Boston, furnishing, delivering battery materials and other electric supplies for use in manual training departments of various schools. To exceed $1,000.

†PUMP CASING—**Boston, Mass.**—Mar. 16, by U. S. Eng., Custom House, furnishing pump casing for main dredging pump for U. S. Dredge Minquas, Circular 61.

WATER CONTROL VALVES, etc.—**Boston, Mass.**—Mar. 17, by Bureau Supplies & Accounts, Navy Dpt., Wash., D. C., water control valves and steel tubing; Mar. 20, box and crate lumber, pine lumber, white oak lumber. To exceed $1,000.

WATER LEVEL RECORDER, etc.—**Leominster, Mass.**—Mar. 16, by City, A. C. R. Rockwell, chn. Bd. Water Comrs., City Hall, furnishing one water level recorder, one wash water tank, pressure gage, flanged hydraulic valves, flanged OS and Y valves, hub end valves. To exceed $1,000. Metcalf & Eddy, 1300 Statler Bldg., Boston, engrs.

MOTOR EQUIPMENT—**Springfield, Mass.**—Mar. 20, by City and C. W. Phillips, supt. Dpt. Streets & Eng., City Hall, motor equipment for Waste Disposal Division. To exceed $1,000.

†MACHINE BOLTS and NUTS—**Duluth, Minn.**—Mar. 17, by U. S. Eng., Canal Park, Duluth, furnishing, delivering machine bolts and nuts for reconstructing mooring pier, Portage River Harbor of Refuge, Keweenaw Waterway, Mich., f.o.b. cars Houghton or Hancock, Mich.

†RAILROAD RAILS, etc.—**Duluth, Minn.**—Mar. 20, by U. S. Eng., Canal Park, Duluth, 4,350 lin.ft. railroad rails, with standard splice bars, and bolts.

TRUCK, etc.—**Madison, Minn.**—Mar. 17, by E. J. Sundby, aud. Lac qui Parle Co., one 4-6 ton truck with 3-yd. dump body and closed cab; and one V type high speed snow plow for such a truck.

†BOILER TUBES—**Vicksburg, Miss.**—Mar. 27, by U. S. Eng., 100 boiler tubes, f.o.b. Vicksburg.

†CREOSOTED PILING—**Vicksburg, Miss.**—Apr. 2, by U. S. Eng., Box 667, Vicksburg, 175 creosoted piling, 45 ft. long.

†STEEL SUCTION HEADS—**Vicksburg, Miss.**—Apr. 3, by U. S. Eng., two 1 cast steel suction heads, f.o.b. Vicksburg.

†CARBON STEEL and SEMI-STEEL CASTINGS—**Kansas City, Mo.**—Mar. 17, by U. S. Eng., 232 Mfg. Exch. Bldg., 97,800 lb. carbon steel and semi-steel castings, Spec. 461-36-538. $6,000.

TRACTOR—**Bemus Point, N. Y.**—Town Bd. Ellery, Bemus Point, T. Halberg, hy. supt., taking bids furnishing caterpillar type tractor for Highway Dpt. $2,750.

†MINE CABLE—**Brooklyn, N. Y.**—Mar. 20, by Signal Supply Officer, Army Base, 100,000 to 140,000 ft. submarine cable.

WHITE PINE, etc.—**Brooklyn, N. Y.**—Mar. 20, by Purchasing Officer, Medical Section, Army Base, 23,000 ft. white pine; 21,000 ft. spruce; and 2,000 ft. Calif. sugar pine.

TRACTORS—**Buffalo, N. Y.**—E. T. Hunt, purch. agt. Bd. Supervs., Erie Co., Buffalo, taking bids 3 gasoline driven tractors, crawler type, for Highway Dpt. To exceed $1,000.

DIESEL ENGINE—**Martville, N. Y.**—Blaisdell Mfg. Co., P. O. Box 21, in market for Diesel engine.

TRUCK—**Canton, O.**—Mar. 18, by Plain Twp. Trustees, A. J. Willaman, clk., 1409 Ridgeway Pl. N.W., one 3-ton dump truck, 3 yd. dump bed, closed cab, shatterproof glass, hydraulic brakes and dual tires. To exceed $1,000.

TAR—**Cincinnati, O.**—Mar. 18, by Comrs. Hamilton Co., 500,000 gal. tested tar for road repair. E. A. Gast, co. engr.

STAIR TREADS—**Cleveland, O.**—Mar. 27, by Bd. Comrs. Cuyahoga Co., G. Stahler, clk., steel stair treads for court house steps. $1,000. J. O. McWilliams, co. engr.

TRANSMISSION and CONVEYING MACHINERY, etc.—**Farmdale, O.**—Kinsman Feed & Supply Co., in market for transmission and conveying machinery and equipment for grain and feed elevator.

FIRE TRUCK—**Corry, Pa.**—Firemen's Relief Assn. taking bids for motor fire pumper truck. $4,000.

TRANSMISSION and CONVEYING EQUIPMENT, etc.—**Exeter, Pa.**—Stevens Colliery, T. Carey, mgr., in market for transmission and conveying equipment and machinery and equipment for new coal tipple.

FIRE TRUCK—**Warren, Pa.**—Fire Committee, Boro Council, R. W. Steber, burgess, taking bids before Apr. 6, for completely equipped fire truck, booster, tank, hose, etc. $2,800. D. Kropf, ch. Fire Dpt.

†AGGREGATE—**Knoxville, Tenn.**—Mar. 27, by Tennessee Valley Authority, Knoxville, 450,000 tons processed aggregate for use as concrete aggregate for Guntersville Dam. C. H. Garity, dir. Purchases.

†DOORS—**Knoxville, Tenn.**—Mar. 23, by Tennessee Valley Authority, Knoxville, furnishing, fabricating and delivering aluminum and hollow metal doors, for Wheeler Control Building. C. H. Garity, dir. Purchases.

†PROCESSED AGGREGATES — **Knoxville, Tenn.**—Mar. 27, by Tennessee Valley Authority, Knoxville, 675,000 tons processing aggregates for use as concrete aggregate for Chickamauga Dam and appurtenant works. C. H. Garity, dir. Purchases.

SLUDGE COLLECTOR EQUIPMENT—**Maryville, Tenn.**—Mar. 18, by Bd. Comrs. at office of J. I. Walker, recdr., furnishing sludge collector equipment for sedimentation tanks, approximate dimensions of each of 2 tanks are length 49 ft., width 11 ft. 4 in. and water depth 6 ft. Bids Feb. 15 rejected. A. R. McCammon, mayor. G. M. Bassel, engr. Noted Jan. 30, C. D.

TURBINES, etc.—**Pecos, Tex.**—See "Earthwork, Irrigation, Drainage and Waterways."

PORTLAND CEMENT, etc.—**Vermont**—Mar. 16, by State, B. N. Sisco, state purch. agt., Montpelier, 922 bbl. Portland cement, 273 cu. yd. sand, 548 cu.yd. crushed stone, 29,237 lb. reinforcing steel, 6,000 pcs. No. 6 steel chairs for mat.; 500 pcs. No. 7 steel chairs for dowels; 11,000 pcs. metal clips; 660 pcs. metal caps for dowels; 574 ft. ¼x6¼ in. premoulded expansion joint; 1,046 gal. refined tar (35-65 viscosity); 20 ft. 12 in., 16 ft. 15 in. and 52 ft. 18 in. rein.-con. pipe; 20 ft. 12 in., 16 ft. 15 in., 24 ft. 12 in., 36 ft. 15 in., 316 ft. 6 in. corrugated galvanized metal pipe, for hy. construction at Barre.

†**Virginia**—Mar. 26, by Pub. Rds., Shenandoah Life Bldg., Roanoke, constructing 9.82 mi. road in Shenandoah Natl. Park from Simmons Gap to Brown Cap Albermarle, Green and Rockingham Counties, incl. 550,500 cu.yd. excav., 34,000 tons crushed stone surfacing, etc. H. J. Spellman, dist. engr.

†LEAD COVERED CABLE, etc.—**Huntington, W. Va.**—Mar. 17, by U. S. Eng., lead covered cable and cable pull boxes, for water supply system, U. S. Locks 1, Kanawha River.

†WIRE ROPE, etc.—**Huntington, W. Va.**—Mar. 17, by U. S. Eng., Huntington, wire rope, clips and thimbles for U. S. Locks 1, 2 and 3, Kanawha River, delivery U. S. Repair Station, Manetta, O.

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†*Federal Government.*

COMPARE

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Materials, etc. (Continued)

COAL HANDLING EQUIPMENT—**Louise, W. Va.**—See "Contracts Awarded."

GRAIN CRUSHER — **Winnipeg, Man.** — A. Bohn, c/o J. D. Morice, 711 MacIntyre Blk., in market for grain crusher and 6 hp. engine.

PUMP—**Parry Sound, Ont.**—Public Utilities Comn., Town Hall, in market for 1,000 g.p.m. capacity pump.

ROAD MACHINE—**Waterford, Ont.**—D. A. Hill, on behalf of Townsend Co., in market for 6 ton power road maintainer machine.

CONTRACTS AWARDED

PUMPS, etc—**Inglewood, Calif.**—City Clerk, furnishing one deep well pump, 300 g.p.m. against a 245 ft. head, connected to 440 volt, 3 phase 50 cycle, 30 hp. motor for installation in city well, to Submersible Motor Pump Co., 3040 East Slauson Ave., Los Angeles, $1,733 est. to exceed $1,000 furnishing welding and laying in trench, steel pipe and fittings, one 75 ft. special bend, 24 in., one same 67 ft., one same 53 ft., one 24x24 in. long radius tee, one 24x 24 in. welded tee, one 24x12 in. welded tee, one 24x8 in. welded tee, one 24x12 in. welded cross, 8,340 ft. 24 in. steel pipe, to Western Pipe & Steel Co., 5717 Santa Fe Ave., $10,487 est. to exceed $15,000. Bids Feb. 18, awarded Feb. 26. Noted Feb. 26, C. D., under "Waterworks."

RAILROAD MATERIAL—**Long Beach, Calif.**—City Council, furnishing electric railway overhead material, Spec. R-878, to Maydwell & Hartzell, 455 Colyton St., Los Angeles, $6,853; track material, Spec. R-876, to Pacific Electric Railway Co., 610 South Main St., Los Angeles, $42,715. Bids Jan. 29. Noted Feb. 10, C. D.

AIR COMPRESSOR—**Los Angeles, Calif.**—Los Angeles Harbor Dpt., City Hall, A. Eldridge, genl. mgr., City Hall, one gasoline engine driven, 2 stage air compressor, capable of delivering 315 cu.ft. per min., at 100 lb. sq.in., Spec. 956, to Pneumatic Mchy. Co., 542 South Bway., $4,550. Bids Feb. 13, awarded Feb. 27. Noted Feb. 24, C.D.

CAST IRON PIPE—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., 30,000 ft. 2 in. c.i. pipe, B. and S., Spec. X-10, to Crane Co., 321 East 3rd St., $5,100. Bids Feb. 4, awarded Mar. 3. Noted Feb. 10, C. D.

†DRILL STEEL—**Los Angeles, Calif.**—U. S. Eng., 751 South Figueroa St., furnishing 14 tons drill steel, Proposal 462, to J. T. Ryerson & Son, 2558 West 16th St., Chicago, Ill., $3,-665. Noted Feb. 21, C. D.

LIQUID CHLORINE—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing liquid chlorine in such quantities as may be required during 1 year beginning Feb. 14, estimated requirements 90 tons in one ton containers, Spec. 1868, to Great Western Electro Chemical Co., 4151 Bandini Blvd., $5,850. Bids Jan. 20. Noted Jan. 30, C.D.

ROAD OIL—**Los Angeles, Calif.**—H. E. Russell, purch. agt. Los Angeles Co., 524 North Spring St., 2,000 bbl. 90% road oil, Spec. 831, to Petrol Corp., 4020 Bandini Blvd., approximately $4,000. Bids Feb. 14. Noted Feb. 25, C.D.

TRUCK CHASSIS—**Los Angeles, Calif.**—A. J. Holm, city purch. agt., City Hall, furnishing 42 more or less 1½ ton truck chassis, Spec. 3456, 32 units, to J. L. Schlosser, 866 South Western Ave., $21,585; 10 units, to W. B. Felix, 1201 South Grand Ave., $10,771. Bids Jan. 21. Noted Jan. 28, C.D.

GATE VALVES—**Oakland, Calif.**—J. Kimball, secy. East Bay Municipal Utility Dist., 512 16th St., furnishing 1 portable, oil-burning, engine-driven air compressor of not less than 370 cu.ft. per min., piston displacement, Proposal 715, to Harron, Rockard & McCone, 2070 Bryant St., San Francisco, $6,550***fifty 44 in., three hundred 6 in., one hundred 8 in. gate valves, Spec. LS-164, to Rensselaer Valve Co., 55 New Montgomery St., San Francisco, $6,-346***20,000 ft. 4 in. and 40,000 ft. 6 in. c.i. pipe, Spec. LS-165, to American Cast Iron Pipe Co., Sharon Bldg., San Francisco, $33,700. Grand total $46,596. Bids Jan. 22, awarded Feb. 27. Noted Jan. 30, C. D.

†GATE ASSEMBLIES—**Denver, Colo.**—Bureau Reclamation, Denver, Colo., high pressure gates for outlets of Island Park Dam, Upper Snake River, Idaho Project, Taylor Park Dam, Uncompahgre, Colorado Project, and Moon Lake Dam, Moon Lake, Utah Project, to Bartlett Hayward Co., 200 South St., Baltimore, Md., $43,477. Bids Feb. 7. Noted Feb. 19, C.D.—Jan. 30, E.N.-R.

CORPORATION and SHUT-OFF COCKS, etc.—**Chicago, Ill.**—City, City Hall, furnishing, delivering 3,350 ¾- to 2-in. corporation cocks and 5,500 ¾- to 2-in. shut-off cocks, to Miller Supply Co., 2100 South Sawyer Ave., Chicago, $2,848 and $6,399 respectively. Bids Feb. 18. Noted Feb. 24, C.D.

FILLING SAND—**Chicago, Ill.**—City, City Hall, furnishing, delivering filling sand during term ending Dec. 31, 1936, to Consumers Co., 111 West Washington St., $22,200. Bids Feb. 20, awarded Mar. 2. Noted Mar. 3, C.D.

LEAD PIPE—**Chicago, Ill.**—City, City Hall, furnishing, delivering 100 tons lead pipe, to Central States Mfg. & Sales Co., 1838 West 33rd St., at 5.53c. per ft. total $11,060. Bids Feb. 24, awarded Mar. 2. Noted Feb. 27, C.D.

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LUMBER—**Chicago, Ill.**—City, City Hall, furnishing, delivering softwood lumber, Groups A, B, C, D and E, during term ending Dec. 31, 1936, to Bishop Lumber Co., 2315 Elston Ave., $67,649; hardwoods Group F, to Edward Haines Lumber Co., 105 West Adams St., $8,493. Bids Feb. 5, awarded Mar. 2. Noted Feb. 14, C.D.—Jan. 30, E.N.-R.

SEWER PIPE—**Chicago, Ill.**—City, City Hall, furnishing, delivering 20 and 24 in. vitr. sewer pipe, 24 and 30 in. long, to N. A. Williams Co., 111 West Washington St., $18,752. Bids Feb. 4, awarded Feb. 20. Noted Jan. 27, C. D.—Jan. 30, E. N.-R.

PIPE, etc.—**South Beloit, Ill.**—City, W. W. Weirick, clk., to Illinois-Wisconsin Concrete Pipe & Tile Co., 228 North LaSalle St., Chicago, 56 ft. rein.-con. sewer pipe, $2.13 per ft.; 1,145 ft. 18 in. at 80c. per ft.; 360 ft. 12 in. at 36c. per ft.; 200 ft. 8 in. at 19.5c. per ft.; 2% discount 15 days***to Ideal Concrete Products & Fuel Co., 624 Eastern Ave., 300 bbl. Portland cement at $2.38 per bbl.; 30,000 sewer brick at $16 per M; discount cement 10c. per bbl. 15 days and on brick $1 per M 30 days ***to Neenah Fdry. Co., Neenah, Wis., 8 catch basin frames $10.50 each; 4 manhole frames and grates at $8.20 each; 2% 10 days, 30 days net***to Milford Lumber & Fuel Co., Beloit, 576 bd. ft. No. 1 fir, $50 per M ft.; 576 ft. No. 1 fir at $48 per M ft.; 128 ft. No. 1 fir at $48 per M ft.; 480 bd. ft. No. 2 yellow pine at $35 per M ft. and 240 bd. ft. No. 2 yellow pine at $40 per ft. G. R. Sharpe, comr. of Streets & Public Improvements. Work by W.P.A. labor. Bids Jan. 13.

LUMBER—**Allison, Ia.**—Butler Co., G. W. Hessalroad, aud., 69,100 ft. BM Class A, and 4,533 ft. BM S4S lumber, to Frudden Bridge Lumber & Supply Co., Greene, $3,639. Bids Mar. 3.

BRIDGE PLANK—**Clinton, Ia.**—Clinton Co., W. B. Gode, aud., 90,000 ft. BM Class A rough fire bridge plank, to Central States Bridge Supply Co., Fort Madison, $4,298. Bids Mar. 2.

CULVERT PIPE — **LeMars, Ia.** — Plymouth Co., L. A. Ludwig, aud., 6,500 lin.ft. 15- to 36-in. corrugated pipe, to Barton-Warner Co., Sioux City, $8,105. Bids Feb. 24. Rejected bids Feb. 24, lumber and piling. Noted Feb. 21, C. D.

METAL PIPE—**Logan, Ia.**—Harrison Co., 3,000 lin.ft. 15- to 48-in. corrugated metal pipe, to Eaton Metal Products Co., 1301 Willis St., Omaha, Neb., $7,083. Bids Feb. 26.

LUMBER, etc.—**Sioux City, Ia.**—Woodbury Co., W. H. Thompson, aud., 16 cars bridge lumber and 12 cars of piling, to E. S. Gaynor Lumber Co., Sioux City, $31,556. Bids Feb. 28. Noted Feb. 18, C. D.—Feb. 20, E. N.-R.

SEWER BRICK, etc.—**Boston, Mass.**—City, Supply Dpt., D. F. Doherty, supt., City Hall Annex, 150,000 sewer brick to Portland Stoneware Co., 80 Federal St., about $2,010; vitr. clay sewer pipe, to Eastern Clay Goods Co., 135 North Beacon St., Brighton, about $3,000. Bids Jan. 28, awarded Feb. 27. Noted Feb. 3, C.D.

TRUCKS—**Aitkin, Minn.**—Aitkin Co., O. V. Cline, aud., five 2½- to 4-ton trucks, to F. R. Heft, Aitkin, $4,905, and to Lange Tractor & Equipment Co., Duluth, Minn., $3,243. Bids Feb. 27.

FIR TIMBERS, etc.—**Minneapolis, Minn.**—City, 33,816 ft. creosoted fir timbers for municipal coal dock, to L. M. Streater Lumber Co., 1001 Lumber Exch. Bldg., $2,020***31,-000 lb. reinforcing steel, to Bethlehem Steel Co., Builders Exch. Bldg., $863***fabricated steel, to American Bridge Co., 629 Southeast 2nd St., $3,590***sheet steel piling and channels, to Carnegie-Illinois Steel Corp., 836 Security Bldg., $17,893. Grand total $22,466. Bids Feb. 13. Noted Feb. 6, C. D.

TRUCKS, etc.—**Minneapolis, Minn.**—City, furnishing two 1½ ton trucks, to Be Vier Harrington Motor Co., 315 South 8th St., $3,058*** 2 truck mixers, to W. H. Ziegler Co., 2331 University Ave. S.E., $3,610. Bids Feb. 26. Noted Feb. 19, C. D.

TRUCK, etc.—**Nashwauk, Minn.**—Village, one 1½ ton truck with dump body and snow plow equipment, to Western Mesaba Oil Co., Nashwauk, $1,142. Bids Feb. 17. Bids Feb. 3, rejected. Noted Jan. 29, C. D.

MOTOR PATROL — **Oliva, Minn.** — Renville Co., 1 motor patrol, to W. H. Ziegler Co., 2331 University Ave. S.E., Minneapolis, $4,517. Bids Feb. 19. Noted Feb. 13, C. D.

†LUMBER—**Kansas City, Mo.**—U. S. Eng., 232 Mfg. Exch. Bldg., 288 MFBM lumber, Spec. 461-36-457, to Marsh & Truman, 332 South Michigan Ave., Chicago, Ill., $4,090. Bids Feb. 24, awarded Feb. 26. Noted Jan. 30, C.D.—Feb. 6, E.N.-R.

†MATTRESS LUMBER—**Kansas City, Mo.**—U. S. Eng., 200,000 bd. ft. mattress lumber delivered to South Point, Spec. 461-36.514, and 300,000 bd. ft. mattress lumber, Spec. 461-36-515, to Superior Timber Co., 1218 Iliva St., St. Louis, $5,800 and $8,865 respectively, est. $6,000 and $9,000 respectively. Bids Feb. 28, awarded Mar. 2. Noted Feb. 18, C.D.—Feb. 20, E.N.-R.

†ROUND WOOD PILES—**Kansas City, Mo.**—U. S. Eng., Mfg. Exch. Bldg., 140,700 lin.ft. wooden piles, f.o.b. contractors plant, to Chapman & Dewey Lumber Co., U. P. Bank Bldg., Memphis, Tenn., $17,000. Est. $14,000. Bids Feb. 20, awarded Feb. 29. Noted Feb. 13, C. D.

†STRAND, etc. — **Kansas City, Mo.** — U. S. Eng., Exch. Bldg., 260,000 ft. galvanized, nealed 3.8 in. diam. strand, f.o.b. Kansas C to Wilkerson Sales Co., 301 Minor Bldg., 552 est. $3,500; 90,800 lin.ft. wooden p f.o.b. contractor's plant, to Anderson Tully North 2nd St., Memphis, Tenn., $12,402 $8,750. Bids Feb. 20. Noted Feb. 14, C. D.

SEWER PIPE—**Portsmouth, N. H.**—City S. S. Woods, supt. Streets, City Hall, 1,500 l 24 in. rein.-con. sewer pipe in connection w P.W.A. Project 1008-R, to F. A. Stock Merrimack, $2.15 per ft. Noted Mar. 6. C D.

LICENSE PLATES—**Trenton, N. J.**—F. A. Brodesser, state purch. agt., 2,000,000 steel auto license plates to E. G. Budd, Broad st. Phila., Pa., at $2.40 a 100.

ROAD GRADER—**Falconer, N. Y.**—Town Bd. of Ellicott, Community Bldg., Falconer, Wa center control motor driven road grader, to W. L. Nuttall, Sherman, $3,000. Awarded Mar. 4.

TRUCK and PUMPER—**Falconer, N. Y.**—Bd. Village Trustees, Community Bldg., furnishing Type 55, 600 gal. fire truck and pumper to Mack International Truck Corp., Erie, Pa., $7,590. Bids Feb. 25, awarded Feb. 27. Noted Feb. 18, C. D.—Feb. 20, E. N.-R.

TAR FILLER—**Cincinnati, O.**—City, 32 tons special tar filler for block pavements, to Barrett Co., 617 Carr St., $729. Awarded Feb. 25.

STEEL RAILS—**Cleveland, O.**—New York, Chicago & St. Louis R.R., Terminal Tower, 500 tons steel rails, to Bethlehem Steel Co., East 3rd St., Bethlehem, Pa.***4,500 tons to Carnegie Illinois Steel Co., Carnegie Bldg., Pittsburgh, Pa.***1,500 tons, to Inland Steel Co., Indiana Harbor, Ind. Est. $230,000. Will place rail by day labor.

AUTOMATIC CHLORINATOR MACHINES — **Oil City, Pa.**—City, furnishing two automatic chlorinator machines for Water Dpt., to Wallace & Tiernan Co., Inc., 11 Mill St., Belleville, Newark, $4,700. Noted Feb. 18, C. D.—Feb. 20, E. N.-R.

†SUCTION DREDGE — **Charleston, S. C.** — U. S. Eng., Custom House, changing 12 in. suction dredge to 14½ in., to Ellicott Machine Corp., 1611 Bush St., Baltimore, Md., $10,978. Bids Feb. 20, awarded Feb. 28. Noted Feb. 7, C. D.—Feb. 13, E. N.-R.

RAILS—**Virginia**—See "Unclassified."

★STEEL RAILS — **Richmond, Va.** — Chesapeake & Ohio R.R. Co., C. W. Johns, ch. engr., Richmond, 2,000 tons steel rails, to Bethlehem Steel Co., Bethlehem, Pa.***6,000 tons, to Inland Steel Co., Indiana Harbor, Ind. ***12,000 tons, to Carnegie Illinois Steel Co., Carnegie Bldg., Pittsburgh, Pa. Est. about $670,000. Will lay rails by day labor.

PROTECTORS—**Tacoma, Wash.**—City Light, City Hall, 4 protectors, 2, to General Electric Co., Washington Bldg., Tacoma, and 2, to Westinghouse Tacoma Bldg., $1,116 each. Est. $2,-400. Bids Feb. 10, awarded Feb. 29. Noted Feb. 21, C. D.—Feb. 27, E. N.-R.

COAL HANDLING EQUIPMENT—**Louise, W. Va.**—Jones Colliers, Inc., Chamber of Commerce Bldg., Pittsburgh, Pa., J. H. Jones, pres., coal handling equipment at Louise Mines, own forces, $20,000.

PUMPING EQUIPMENT — **Campbellsport, Wis.**—Village, pumping equipment for waterworks, to American Well Wks., Aurora, Ill., $3,456. Bids Feb. 17.

FIRE TRUCK—**Green Bay, Wis.**—City, fire truck, to American-LaFrance & Foamite Industries, 230 South Penn St., Indianapolis, Ind., $8,322. Bids Jan. 25. Noted Jan. 22, C.D.

TRUCK—**Neenah, Wis.**—City, furnishing 1½ ton truck with hydraulic hoist, to Wolter Motor Co., Neenah, $932. Bids Jan. 29. Noted Jan. 24, C.D.

TRUCK and SNOW PLOW—**Little Chute, Wis.**—Village, furnishing truck and snow plow, to 4 Wheel Drive Auto Co., Clintonville, $5,700. Bids Jan. 21.

†PORTLAND CEMENT, etc. — **Milwaukee, Wis.**—National Park Service, Milwaukee, 320 bbl. Portland cement in cloth bags, to Cities Fuel & Supply Co., 6639 West National Ave., $2.74, disc. 5/10; 300 cu.yd. torpedo sand, to Berthelet Pipe & Supply Co., 820 West Montana St., $1.65. Bids Feb. 21.

†TOWERS, etc. — **Milwaukee, Wis.** — U. S. Forest Service, to Aermotor Co., Chicago, steel lookout towers, Items (1) $17,430 (2) $1,480 (3) $3,270 (4) $10,790***to Devoe & Raynolds Paint Co., 825 West Chicago Ave., Chicago, Ill., 570 gal. stain, $274. Grand total $33,244. Bids Feb. 3.

†WIRE, etc.—**Milwaukee, Wis.**—U. S. Forest Service, galvanized telephone wire, to Kellogg Switchboard & Supply Co., 1066 West Adams St., Chicago, Ill., $296***pack socks, to Colorado Tent & Awning Co., 1642 Lawrence St., Denver, Colo., $512***well drilling machine, to R. R. Howell, Malcom Ave. and Southeast 4th St., Minneapolis, Minn., $1,496***galvanized telephone wire, to Graybar Electric Co., Inc., 778 North Milwaukee Ave., $352. Grand total $3,156. Awarded Mar. 2.

†PORTLAND CEMENT—**Rhinelander, Wis.**—Treas. Dpt., Procurement Div., 475 bbl. Portland cement, paper bags, f.o.b. Haywood, for use on W.P.A. projects, to H. E. Beckwith Lumber Co., Hayward, $2.61 per bbl.

†*Federal Government.*

Materials, etc. (Continued)

CRANE—**Nanaimo, B. C.**—Secretary Dpt. P. Wks., Ottawa, supply and installation of 6 ton travelling electric operated crane, to Dominion Bridge Co. Ltd., Lachine, Que., $23,400. Bids Feb. 25, awarded Feb. 28. Noted Jan. 29, C. D.—Feb. 6, E. N.-R.

ASPHALT CEMENT, SAND, etc.—**Hamilton, Ont.**—Bd. Control, annual civic supplies and equipment from Mar. 1, 1936, to Mar. 1, 1937, asphalt cement, road oil, asphalt block filler and fuel oil, to Imperial Oil Ltd., Main and Walnut Sts.***asphalt sand, to Canada Crushed Stone Corp. Ltd., 42 James St. N.***bronze and brass castings, to Chadwick-Carroll Brass & Fixtures Ltd., 365 Wilson St.***brass work, to Chadwick-Carroll Brass & Fixtures Ltd., 365 Wilson St., and to Empire Brass Mfg. Co. Ltd., 20 Jackson Ave. W.***c.i. water pipe and specials, to Gartshore-Thompson Pipe & Fdry. Co., Stuart St. W.***concrete sewer pipe, to Hamilton Builders Supply Co. Ltd., 37 Lloyd St., and A. Cope & Sons Ltd., 19 Albert St.***concrete sand, to Sackville Hill, 52 Elgin St., and to Canada Crushed Stone Corp. Ltd.***crushed stone and screenings, to Sackville Hill, 52 Elgin St., and Canada Crushed Stone Corp. Ltd., and Hamilton Builders Supply Ltd.***iron castings, to Brawn Baggs Co. Ltd., 37 Victoria Ave. N.***limestone dust, to Windmill Point Crushed Stone Co. Ltd., 225 Sterling Rd., Toronto*** emulsion, to Colas Roads Ltd., 21 Dundas Sq., Toronto***tar, to Currie Products Ltd., Sheaffer St.***vitr. sewer pipe, to National Sewer Pipe Co. Ltd., Wentworth Ave. N.***extension boxes, to Canada Iron Foundries Ltd., Stuart St. W. Noted Feb. 18, C. D.

TRANSFORMER, etc.—**London, Ont.**—London Pub. Utilities Comn., transformer and protector, to Canadian General Electric Co. Ltd., 312 King St. W., Toronto, $6,000. Noted Jan. 23, C. D. —Jan. 30, E. N.-R.

LUMBER—**Regina, Sask.**—H. S. Carpenter, deputy minister Dpt. Hys., supplying 82,161 B.M. ft. lumber and 480 lin.ft. piling, to Timberland Lumber Co. Ltd., New Westminster, B. C. Noted Jan. 22, C. D.

FOREIGN

China, Shanghai—Orient Paint, Color & Varnish Co., Ltd., in market for zinc oxide, white lead, red lead, linseed oil, red oxide of iron, bronze powder and zinc 5 per cent leaded. Samples and price quotation c.i.f. now wanted.

Denmark, Copenhagen—Government of Iceland applied to Legislature for permission to establish a calcium nitrate plant. To exceed 1,500,000 kronan.

England—Paramount Brick & Tile Co., Ltd., **London**, plans plant for manufacturing brick, tile, slate, pipes and pottery, 30 York Rd., Kings Cross. North***Wessex Distilleries, Ltd., G. J. Abell, mgr., 8 Rolle St., **Exmouth**, plans constructing plant for manufacture of brick and tile.

England, London — H. F. C. Crookshanks, secy. Mines, announces plans for plant at Billingham for manufacturing synthetic gasoline.

Hungary—The Destiltitis Chemical Co., **Pestzentersehet**, prepares plans manufacturing formaldehyde, solvents, textile trade materials, etc.***E. Sauerwald Co., Vi-Mohaco-U 5 **Budapest**, plans plant manufacturing active carbon, etc.***Obidaer Starkefabric Budget, **Budapest**, prepares plans plant for synthetic resin, etc.

Irish Free State, Dublin—Government votes $3,500,000 for housing scheme.

Japan—Japanese Seat Water Industrial Co. (Nippon Kaisui Kogyo K.K.), **Osaka**, prepares plans for plant for extracting compounds of magnesium, potassium, bromide and other chemicals from sea water, 500,000 yen***Japan Mining Co., **Saganoseki**, preparing plans nickel refinery, $700,000.

Manchuria, Fushun—South Manchurian Railway Co. prepares plans constructing 3 new plants for production of aluminum soda, and liquid fuel from coal, 70,000,000 yen.

Mexico—Mexican Government Ministry of Communications, Mexico City, plans constructing highway from Mexico City to Guadalajara and highways connecting railways with agricultural centers, not having rail service, $11,000,000. **Maturity this year.** Cost will be shared by Mexican and various state governments.

Mexico, Matamoros—Mexican Federal Government, c/o Engineering Branch, Mexico City, making plans constructing municipal waterworks, retaining tank, rein.-con. distributing lines, chlorinators, fire plugs, wells, pumps, etc. 350,000 pesos.

Northern Ireland, Belfast—Municipality voted $860,000 for steam boiler plant, capacity extension at Harbor Power Station. Bids in April.

Scotland—Glasgow Municipality making plans and takes bids in April, 790 houses on Berryknowes Rd., $1,600,000. Private plans*** **Paisley** Municipality making plans 341 dwellings at Westmarch, $710,000***Campbelltown Municipality prepares plans gas works modernization and supply of vertical retorts; **Campbelltown** Municipality prepares plans 310 houses $625,000***Ayr Municipality prepares plans 600 houses $1,350,000.

Scotland, Bellshill—Archibald Russell Ltd., preparing plans 150,000 per week capacity brick works.

†*Federal Government.*

Scotland, Carlops—John Wickham, Ltd., Deanbank, Gorebridge, plans developing silica sand deposits, and erecting necessary buildings, purchasing all essential equipment.

Scotland, Inverness—John Burnett Son & Co., archts., prepares plans for hospital for Royal Northern Infirmary. $500,000.

South Africa—Atlas Cement Co. of South Africa, **Henneman**, plans plant, $1,625,000*** **Johannesburg** Municipality plans large gas works addition.

Tasmania, Launceston—R. J. Strike, engr. Hydro-Electric Comn. prepares plans high level power scheme on South Esk. $1,500,000.

PUBLIC BUILDINGS

PROPOSED WORK

Ala., Dotham—Houston Co. Bd. Educ., plans 8 additions and 4 new schools. $170,000. P.W.A. project. C. H. McCauley, 705 Jackson Bldg., archt.

†**Ariz., Sasabe**—Treas. Dpt. at office Sup. Archt., Wash., D. C., rejected bids Feb. 14, constructing inspection shed. Will readvertise. Noted Mar. 4, C. D.—Jan. 23, E. N.-R.

Calif., Glendale—City plans by Postle & Postle, 501 West Patterson St., and J. A. Grundfor, 114 A West Broadway, 90x148 ft., rein.-con. recreation center, incl. 2,000 seating capacity auditorium, check rooms, smoking rooms and 120x164 ft. swimming pool, 50 ft. wide, filtration and chlorination system, Verdugo Rd. near Mountain St. $481,376.

Calif., Los Angeles—Bd. Educ., Chamber of Commerce Bldg., plans by A. F. Rosenheim, 629 Chamber of Commerce Bldg., boys physical education building, new administration building and shop building at Hollenbeck Junior High School, 602 South Soto St. $380,000. R. E. Phillips, mechanical engr., 603 Architects Bldg., and R. Mc. Beanfield, structural engr., 629 Chamber of Commerce Bldg.; C. A. Sanborn & Co., electrical engrs., 357 South Hill St. Appointed by owner. Noted Jan. 16, C. D.—Jan. 23, E. N.-R.

Calif., Los Angeles—Los Angeles Bd. Educ., Chamber of Commerce Bldg., plans by R. J. Neutra, 2348 Silver Lake Blvd., school buildings at Ralph Waldo Emerson Junior High School, $195,000. W. Mellama, structural engr., 16614 Beverly Blvd., and R. E. Phillips, mechanical engr., 603 Architects Bldg., preparing mechanical and structural plans for same. Noted Jan. 16, C. D.—Jan. 23, E. N.-R.

★ **Calif., Los Angeles**—Bd. Educ., Chamber of Commerce Bldg., plans by S. P. Hunt, 701 Lauzhlin Bldg., for Junior College at Western Dist. Junior High School, $400,000; plans by Allison & Allison, 1014 Edison Bldg., administration building, auditorium, science hall and students' lunchroom at Los Angeles Junior College, 855 North Vermont Ave., $470,000; plans by E. Bergstrom, 1136 Citizens National Bank Bldg., new Junior High School in Verdugo Road Dist., $400,000; plans by Austin & Ashley, Chamber of Commerce Bldg., new Junior High School in Lincoln Park Dist., $400,000; plans by M. C. Hunt & H. C. Chambers, 1216 Continental Bldg., new Junior High School in South Los Angeles Dist., $400,000; plans by A. C. Zimmerman, 709 H. W. Hellman Bldg., new Junior High School in downtown district, $420,000; plans by Parkinson & Parkinson, 808 Title Insurance Bldg., new school district administration building near old Sentous Center School, 1205 West Pico St., $425,000; plans by Taylor & Taylor, 803 West 3rd St., new school building at Berendo Junior High School, 1145 South Berendo St., $230,000; plans by C. Beelman, 1019 Union Bank Bldg., auditorium and classroom building at Utah St. School, 174 North Utah, $140,000. R. M. Storm & C. T. Gibbs, 816 West 5th St., mechanical engrs. F. N. Doughy, 9273 Cordell Rd., structural engr.

★ **Calif., Pomona**—Los Angeles Co., C. B. Afflerbaugh, secy., and engr., Fair Assn., plans 1 story, 239x750 ft., rein.-con. livestock building on County Fairgrounds in Pomona. To exceed $400,000.

Calif., San Pedro—Los Angeles Bd. Educ. plans by G. B. Kaufman, 627 South Carondelet St., Los Angeles, building at San Pedro High School, containing auditorium building and physical education, 1221 South Gaffey St. $195,000. E. L. Ellingwood, mechanical engr., H. W. Hellman Bldg., Los Angeles, and F. N. Dlouhy, structural engr., 9273 Cordell Dr., Los Angeles, preparing mechanical and structural plans. Noted Jan. 16, C. D.—Jan. 23, E. N.-R.

Ill., Rock Island — Bd. Educ. rejected bids Dec. 3, constructing Frances Willard School, brick, stone, concrete. $160,000. Project postponed indefinitely. Cervin & Stuhr, Safety Bldg., archts. Noted Nov. 21, C. D.—Nov. 28, E. N.-R.

Ind., Smithville—Bd. Educ. plans grade and high school. Est. about $140,000. Architect not appointed.

Ia., Rock Rapids—City voted $100,000 for improving and extending municipal light and power plant and distribution system. $185,000. Black & Veatch, 4706 Bway., Kansas City, Mo., consult. engrs. Noted Feb. 19, C. D.

†**Me., Fort Williams**—U. S. Eng., Wash., D. C., making plans constructing officers' quarters, garage and radio towers. $74,000.

Me., Old Orchard—Town, Bd. Selectmen, Town Hall, plans nearing completion by Bunker & Savage, 256 Water St., Augusta, 2 story, basement, 66x152 ft. and 52x72 ft., brick, steel, stone high school, concrete found. To exceed $150,000. Noted Sept. 9, C. D.—Sept. 12, E. N.-R.

†**Mass., Ayer** — Con. Q. M., Fort Devons, sketches constructing brick garage, officers' quarters, fire station, Fort Devons. $35,000.

Mass., Chicopee—City, J. J. Desmond, Jr., supt. of Schools, sketches by H. J. Tessier, 220 Dwight St., Springfield, brick, steel Junior High School, Fairview Terrace. $250,000. Noted Dec. 19, C. D.—Dec. 27, E. N.-R.

Mass., Springfield — Massachusetts State Grange, E. H. Gilbert, secy. of Committee, North Easton, plans grange building at Eastern State Exposition grounds. To exceed $140,000. Architect not definitely selected. **Maturity in 1936.**

Mo., Farmington—State Building Comn., Jefferson City, making plans five 72x128 ft., rein.-con., brick residences, $400,000, and constructing steel windows, roof, concrete floors, etc. at infirmary, $200,000. C. A. Haskens, Capitol Bldg., Jefferson City, engr.

Mo., Kirkwood (St. Louis P. O.)—Kirkwood School Dist., H. E. Suits, pres. Bd. Educ., called off election scheduled for Mar. 10, to vote $253,000, for constructing schools and additions to several schools. Noted Feb. 27, C. D.

Mo., Mount Vernon — Missouri State Sanitorium, Mount Vernon, and Bi-Partisan Advisory Bd., State Building Comn., E. M. Regan, executive secy., State Capitol, Jefferson City, plans constructing power plant, equipment, etc. Baumes & McDevitt, Railway Exchange Bldg., St. Louis, and R. Tuensfeldt, Security Bldg., St. Louis, engrs. $200,000. Noted Nov. 15, C. D.—Nov. 21, E. N.-R.

Mo., Nevada—State Building Comn., Capitol Bldg., Jefferson City, making plans constructing 3 story, basement, ward building and kitchen, in connection with state hospital, $350,000. C. A. Haskens, 426 Capitol Bldg., Jefferson City, engrs.

Mo., St. Joseph—State Building Comn., Jefferson City, plans by L. R. Bowen, Jefferson City, 5 story, basement, 300x400 ft. infirmary, for State Hospital for Insane. $450,000. P.W.A. project. C. A. Haskens, Capitol Bldg., Jefferson City, engr.

Mo., St. Louis—Bd. P. Serv., City Hall, soon takes bids completing upper floors (interior work only) of civil courts building, 12th Blvd. at Market St. $450,000. P.W.A. project. Plaza Comn., Inc., c/o Klipstein & Rathmann, 316 North 8th St., engrs. and archts.

Mo., St. Louis—Bd. P. Serv., City Hall, soon takes bids 1 story, basement, 50x70 ft. police station and 50x70 ft. attached garage, rein.-con., brick, 3015 Lucas Ave. $125,000-$140,000. W. E. C. Becker, city engr., A. Osburg, city archt. Noted Feb. 10, C. D.—Feb. 13, E. N.-R.

Mont., Missoula—State, c/o Bd. Educ., E. Ireland, secy., Helena, plans completed by R. C. Hugenin, Butte and Helena, 3 story, basement journalism building, $180,000; 3 story, basement chemistry building, $225,000, both rein.-con., brick, at University of Montana. P.W.A. project.

N. M., Albuquerque—State, Capitol, Santa Fe, plans constructing fair buildings and facilities for Fair Grounds. $215,000. W.P.A. project.

N. Y., Albany—Regional Market Authority, City Hall, making plans constructing regional market. $300,000. Will float bond issue at once to cover cost of property estimated between $250,000 and $300,000. J. J. McManus, c/o owner, archt. Noted Jan. 17, C. D.—Jan. 23, E. N.-R.

†**N. Y., Bronxville**—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans constructing brick, steel U. S. Post Office, plain found., Pondfield Rd. between Tanglewylde and Meadow Aves. $64,000. **Maturity in spring.** Site purchased.

N. Y., Brooklyn—Dpt. Purchase, Municipal Bldg., New York, plans by C. N. Ely, c/o owner, 1 story, 55x145 ft., brick storage building, 855 Remsen St. $200,000.

N. Y., Canaan — Sloane Trade School, c/o Berkshire Industrial School, plans rebuilding school, destroyed by fire, and will purchase trade school equipment. To exceed $140,000. Architect and engineer not appointed. H. H. Graham, school supt.

N. Y., Ithaca—City, City Hall, bids late in March, brick, steel hospital, plain found. Est. about $140,000. P.W.A. project. A. N. Gibb, Ithaca, archt.

†**N. Y., New York**—Treas. Dpt. at office Sup. Archt., Wash., D. C., rescinded contract special lighting fixtures in court house. Bids Jan. 31. Noted Mar. 5, C.D.—Mar. 12, E.N.-R., under "Contracts Awarded."

N. C., Albemarle—Stanly Co. Bd. Educ., O. J. Sikes, chn., plans schools, $380,000. T. H. Yoe, Salisbury; Northrup & O'Brien, Winston-Salem, archts. for county schools; C. C. & W. W. Hook, Charlotte, archits. for 2 schools in town of Albemarle.

★ **O., Ashland**—City Council, W. A. Mason, mayor, plans electric light plant and distribution system. $1,020,859. Barstow & Lefeber, 31 North Summit St., Akron, engrs. Noted Jan. 3, C. D.—Jan. 9, E. N.-R.

O., Sebring—City Council authorized J. A. Reddy, city clk., to obtain estimates of cost

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Public Buildings (Continued)

of survey for constructing municipal light and power plant.

★ **Pa., Scranton**—School Bd. soon takes new bids new Southside Junior High School, $1,250,000. P.W.A. project. Former contract rescinded. T. R. Williams, c/o owner, engr. J. J. Howley Scranton, archt. Noted Feb. 26, C. D.—Mar. 5, E. N.-R.

R. I., Howard (Cranston)—State, Emergency P. Wks. Comn., State House, Providence, revised plans by F. R. Hindle, 49 Weybosset St., Providence, tubercular building, at Mental Hospital. Bids Feb. 8 rejected. Est. $180,000. P.W.A. project. Noted Feb. 19, C. D.—Jan. 30, E. N.-R.

S. D., Vermillion—City, c/o E. A. Lenhart, aud., furnishing, installing one 1,000 hp. engine in municipal power plant. J. W. Kolb, city engr.

Tex., Port Isabel—San Benito-Pt. Isabel Navigation Dist., c/o Judge Q. Louthan, mgr., and Col. E. H. Downs, chn., soon takes bids 100 x200 ft., rein.-con., mono-type warehouse for handling fresh fruits, vegetables, duplication of present facilities at turning basin. $200,000. Engineer, c/o District Board, engr.

★ **Wis., Oshkosh** — Winnebago Co. plans by Granger & Bollenbacher Co., 333 North Michigan Ave., Chicago, Ill., constructing court house. $800,000. Board rescinded action taken on appointing former archts. Noted Feb. 28, C. D.—Mar. 5, E. N.-R.

BIDS ASKED

†**Calif., Selma**—Apr. 14, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

†**Calif., Tracy**—Apr. 9, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $67,000. Bids July 30 rejected. Noted Aug. 5, C.D.—July 4, E.N.-R.

Conn., Torrington—Mar. 20, by City, City Clerk, City Hall, 3 story, 100x155 ft., brick, stone, steel town hall unit. $200,000. C. V. Johnson, 7 College Ave., Torrington, and Ebbets & Frid 15 Lewis St., Hartford, archts. Mylchreest & Reynolds, 238 Palm St., Hartford, and Hubbard, Rickard & Blakely, 1109 Chapel St., New Haven, engrs. Noted Jan. 13, C. D.—Jan. 16, E. N.-R.

†**Ga., Valdosta**—Mar. 24, by Treas. Dpt. at office Sup. Archt., Wash., D. C., miscellaneous betterments at U. S. Post Office. Noted Aug. 16, C.D.—Oct. 10, E.N.-R.

†**Ga., Waycross**—Mar. 25, by Treas. Dpt. at office Sup. Archt., Wash., D. C., entrance changes at U. S. Post Office and Court House.

†**Ind., Dunkirk**—Mar. 27, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

†**Ind., Indianapolis**—Mar. 30, by Treas. Dpt. at office Sup. Archt., Wash., D. C., elevator plant in extension to U. S. Post Office and Court House.

La., Ruston—Apr. 4, by State Bd. Educ., Baton Rouge, Maison Blanche bldg., administration and classroom building and auditorium and music building. $400,000. Weiss, Dreyfours & Seiferth, New Orleans, archts. Noted Jan. 15, C. D.—Jan. 23, E. N.-R.

†**Md., Upper Marlboro**—Mar. 27, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $70,000. Noted Jan. 14, C. D.—Jan. 16, E. N.-R.

Minn., Hutchinson—Mar. 18, by city, D. A. Adams, clk., constructing municipal electric power plant building and equipment. $250,000. Existing distribution system to be purchased from private owner. Buell & Winter Eng. Co., 813 1st Natl. Soo Line Bldg., Minneapolis, and 503 Insurance Exch. Bldg., Sioux City, Ia., engrs. Noted June 10, C. D.—June 13, E. N.-R.

†**Minn., International Falls**—Mar. 20, by Treas. Dpt. at Office Sup. Archt., Wash., D. C., constructing basement offices, etc., in U. S. Post Office.

†**Minn., Litchfield**—Mar. 25, by Treas. Dpt. at office Sup. Archt., Wash., D. C., betterments to U. S. Post Office.

†**Miss., Newton**—Mar. 27, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $64,000.

Mo., St. Louis—See "Contracts Awarded."

Neb., Fremont—Mar. 20, by City, general contract municipal auditorium. $180,000. P.W.A. project. G. Grabe, Fremont, archt. Noted Feb. 11, C. D.—Feb. 20, E. N.-R.

N. H., Rollinsford—Mar. 18, by Town, E. F. Tozier, chn. School Dist., Savings Bank Bldg., 1 story, basement, 56x109 ft. and 35x56 ft. grade school, Locust and Willey Sts. Former contracts rescinded. P.W.A. project. Huddleston & Hersey, Durham, archts. Noted Feb. 3, C. D.—Feb. 6, E. N.-R., under "Contracts Awarded."

N. Y., Brooklyn—Mar. 26, by Dpt. Hospitals, S. S. Goldwater, comr., 125 Worth St., New York, constructing, general contract, plumbing, boiler plant and mechanical equipment, electrical work, lighting fixtures for altering and constructing additions to boiler plant of Coney Island Hospital, Ocean Parkway, East 6th St., Guider Ave. and Avenue Z. P.W.A. project. L. E. Jallade, 597 5th Ave., New York, archt.

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★ **N. Y., Marcellus** — Mar. 27, by Central School Dist. 1, general contract plumbing, heating, electrical work for school. $530,000. P.W.A. project. C. W. Clark, 27 North Main St., Cortland, archt. Noted Jan. 14, C. D.—Jan. 16, E. N.-R.

†**N. Y., Mount Vernon**—Mar. 20 (extended date), by Treas. Dpt. at office Sup. Archt., Wash., D. C., completing extension and remodeling U. S. Post Office. Noted Feb. 17, C. D.—Feb. 20, E. N.-R.

N. Y., New York—See "Contracts Awarded."

N. Y., New York—Mar. 19, by Dpt. Hospitals, S. S. Goldwater, comr., 125 Worth St., constructing electrical work for superstructure for Pavilions C and D, Bellevue Hospital, on 1st Ave., 26th to 29th Sts. P.W.A. project. McKim, Mead & White, 101 Park Ave., archts.

N. Y., New York—Mar. 16, by Dpt. Hospitals, S. S. Goldwater, comr., 125 Worth St., general contract and laundry machinery, steam fitting, ventilating, plumbing and electrical work for altering laundry at Gouverneur Hospital, Water St. and Gouverneur Slip. P.W.A. project. C. Butler, 56 West 45th St., New York, archt.

N. Y., New York—Mar. 25, by Dpt. Hospitals, S. S. Goldwater, comr., 125 Worth St., general contract, plumbing, electrical work, power plant and tunnel piping, for power plant on Welfare Island. P.W.A. project. Starrett & Van Vleck, 267 5th Ave., New York, archts.

N. Y., Pavilion—Central School Dist. bids about Mar. 29, constructing 2 story high school and grade school. $240,000. P.W.A. project. J. L. M. Uphill, rural school supt. Noted Jan. 6, C. D.—Jan. 9, E. N.-R.

N. Y., Spencer—Central School Dist. 1, Tioga Center, bids about Apr. 1, constructing superstructure grade and high school. $166,990. P.W.A. project. Foundation contract awarded to J. M. Knowlton Co., 201 Robinson St., Binghamton. Conrad & Cummings, 97 Collier St., Binghamton, archt. Noted Oct. 31, C. D.—Nov. 7, E. N.-R.

†**N. C., Shelby**—Mar. 30, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office.

†**N. C., Winston Salem**—Mar. 16, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing interior lighting fixtures for U. S. Post Office.

N. D., Grafton—Mar. 23, by State Bd. Administration, E. G. Wanner, exec. secy., Capitol, Bismarck, superstructure for 4 story, basement, 39x183 ft., rein.-con., brick, stone dormitory, State School. $160,000. P.W.A. project. E. W. Molander, Minot, archt. Hess & Deeter, Minot, assoc. archts. Noted Dec. 27, C. D.—Jan. 2, E. N.-R.

†**Okla., Claremore**—Apr. 7, by Dpt. Indian Affairs, Dpt. Interior, Wash., D. C., constructing hospital building, Proposal 1282. Noted Nov. 4, C. D.—Nov. 7, E. N.-R.

†**Okla., Tahlequah**—Apr. 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

†**R. I., Newport**—Mar. 20, by U. S. Pub. Wks. Officer, Naval Training Station, Newport, painting exterior buildings Quarters "I," at Naval Station, Spec. 8173.

†**Tenn., Memphis**—Mar. 19 (extended date), by P. Wks. Administration, Div. Housing, Wash., D. C., constructing foundations for Dixie Homes Housing Project H-3401. Noted Feb. 24, C. D.—Feb. 27, E. N.-R.

★ **Tenn., Nashville** — Mar. 24, at office of Governor Hill McAllister, State Capitol Bldg., constructing supreme court building, $642,857. P.W.A. project. Marr & Holman, 702 Stahlman Bldg., archts.

†**Tex., Laredo**—Mar. 27, by Treas. Dpt. at office Sup. Archt., Wash., D. C., furnishing, installing passenger and sidewalk elevator U. S. Post Office extension.

Tex., Marfa—See "Unclassified."

Tex., Pecos — See "Earthwork, Irrigation, Drainage and Waterways."

Tex., Yorktown—City bids about Mar. 15, brick, rein.-con. light and power plant. $100,000. P.W.A. project. Garrett Eng. Co., 300 Hughes St., Houston and Yorktown, engrs. Noted Oct. 24, C. D.—Oct. 31, E. N.-R.

Wash., Pullman—Apr. 25 (extended date), by Bd. Regents Washington State College, Campus, 4 story, 76x100 ft. gymnasium, swimming pool and health building for women, $400,000. P.W.A. project. Noted Mar. 4, C. D.—Mar. 13, E. N.-R.

Wash., Seattle — Mar. 24, by Bd. Regents Washington University, lighting fixtures and kitchen equipment for women's dormitory (now under construction), $10,500. D. J. Meyer, Central Bldg., and J. Graham, Dexter Horton Bldg., archts. Noted Sept. 6, C. D.—Sept. 12, E. N.-R.

†**Ont., Ottawa**—Mar. 20, by Treas. Dpt. at office Sup. Archt., Wash., D. C., remodeling American Legation building.

CONTRACTS AWARDED

†**Ariz., Tucson**—Vet. Bu., Arlington [illegible] Wash., D. C., constructing additions and alt[illegible] Administration Building 1, to E. A. Dow[illegible] son, $22,654. Bids Feb. 28. Noted Ma[illegible] C.D.—Jan. 30, E.N.-R.

†**Calif., Madera**—F. J. Reilly, general con[illegible] tor, 6350 Fulton St., San Francisco, plum[illegible] and heating for U. S. Post office to Scott [illegible] 243 Minna St., San Francisco for Treas. [illegible] at office Sup. Archt., Wash., D. C.***elect[illegible] work, to American Electric Co., 462 Bryant [illegible] San Francisco***sheet metal, to Morris[illegible] & Co., 74 Duboce Ave., San Francisco***[illegible] work, to H. Drake, 666 Mission St., San F[illegible] cisco; steel sash, to Fire Protection Prod[illegible] Co., 1101 16th St., San Francisco***paintin[illegible] A. A. Zelinsky, 3011 Steiner St., San Fran[illegible] ***excavation, to R. W. Brown, Mader[illegible] structural and reinforcing steel, to Kyle & [illegible] Fresno. Noted Jan. 3, C. D.—Jan. 9, E. N.-R., under "Contracts Awarded."

Calif., Red Bluff—C. H. Dodd, general con[illegible] tractor, 1660 West Walnut St., Stockton, plumb[illegible] ing, heating and sheet metal, for 1 and 2 story, basement, rein.-con. hospital, for Tehama [illegible] to M. R. Carpenter, Sacramento***electr[illegible] work, to Cox Electric Co., Red Bluff***paint[illegible] to J. Burdon, Richmond***reinforcing steel [illegible] Truscon Steel Co., 1750 Army St., San Fran[illegible] cisco. P.W.A. Noted Jan. 28, C. D.—Jan. [illegible] E. N.-R., under "Contracts Awarded."

Calif., Salinas—F. J. Reilly, general con[illegible] tor, 6350 Fulton St., San Francisco, plumbing and heating for school, to Scott Co., 243 Minna St., San Francisco, for Salinas City School [illegible] ***electrical work, to C. Langlais, 472 Tehama St., San Francisco***sheet metal, to Morrison & Co., 74 Duboce Ave., San Francisco***painting, to W. G. Thompson, 326 Church St., San Francisco***reinforcing steel, to W. S. Wise hall, 17th and Wisconsin Sts., San Francisco ***structural steel, to Golden Gate Iron Works, 1541 Howard St., San Francisco***concrete, to Central Supply Co., Salinas***iron work, to Engler Iron Wks., Box 11, San Jose. Noted Jan. 3, C. D.—Jan. 9, E. N.-R., under "Contracts Awarded."

Calif., San Francisco—Dpt. P. Wks., general contract machine shop, Geary Blvd. near 32nd Ave., for City and San Francisco Co., to Moore Constr. Co., 735 Portola Dr., $120,987. Bids Feb. 7, awarded Feb. 28. Noted Feb. 18, C. D.—Oct. 24, E. N.-R.

Calif., Santa Rosa—P. J. Walker Co., general contractors, Sharon Bldg., San Francisco, steel sash and screens and reinforcing steel and metal forms for county hospital for Sonoma Co., to Soule Steel Co., 1750 Army St., San Francisco ***plumbing and heating, to H. Lawson, 465 Tehama St., San Francisco***sheet metal, to Richmond Sheet Metal Wks., 526 16th St., Richmond***electrical work, to N. Russell, Healdsburg***elevators, to Otis Elevator Co., 1 Battery St., San Francisco. Noted Feb. 3, C.D.—Feb. 6, E. N.-R., under "Contracts Awarded."

†**Conn., Bristol**—Treas. Dpt. at office Sup. Archt., Wash., D. C., furnishing, installing electric lighting fixtures to Multi Electric Mfg. Co., Jefferson and Washington Sts., Chicago, Ill., $620. Bids Dec. 4. Noted Dec. 10, C. D.

Conn., Seymour—S. Abbadessa, general contractor, 6 Church St., New Haven, steel rods, wire mesh for high school, to Truscon Steel Co., 42 Church St., New Haven***brick, to J. L. Stiles & Son Brick Co., North Haven*** utility tile, to Warner-Miller Co., Railroad Ave., New Haven***plumbing, heating and ventilating, to Foskett & Bishop Co., Blatchley Ave., New Haven***millwork, to Lockwood Sash & Dr. Co., 155 Charter Oak Ave., Hartford***tile, to O. Ramadei & Son, 24 Bond St., New Haven ***electrical work, to A. A. MacPherson Co., 426 Platt Ave., West Haven***partitions, to A. R. Kirschner Co., 30 Whitney Ave., New Haven***steel erection, to Roger Sherman Transfer Co., 60 Bradley St., New Haven*** metal ceilings, to Shelton Roofing Co., 6 Bank St., Ansonia***painting, to New Haven Painting & Decorating Co., 7 Whitney Ave., New Haven***iron, to M. Kramer Iron Wks., 83 York St., New Haven***structural steel, to Bethlehem Fabricators, Inc., 555 Albany Ave., West Hartford***insulation, to Shelton Roofing Co., Ansonia***excavating, to Seymour Sand & Stone Co., 482 North Main St., Seymour. Noted Jan. 21, C. D.—Jan. 23, E. N.-R., under "Contracts Awarded."

Conn., Seymour—H. Wales Lines Co., general contractors, 134 State St., Meriden, brick for town hall, to I. L. Stiles & Son Brick Co., North Haven, for Town***unglazed tile, to Warner Miller Co., Railroad Ave., New Haven ***iron, steel, to Conn. Steel Erecting Co., 1013 State St., New Haven***heating, plumbing, to Foskett & Bishop Co., Blatchley and River Sts., New Haven***electrical work, to A. A. MacPherson Co., 1426 Platt Ave., West Haven*** roofing, to Shelton Roofing Co., 6 Bank St., Ansonia. Noted Jan. 21, C. D.—Jan. 3, E. N.-R., under "Contracts Awarded."

†**Conn., Westport**—Structural Eng. Corp., general contractors, 110 East 42nd St., New York, N. Y., erecting structural steel for U. S. Post Office for Treas. Dpt. at office Sup. Archt., Wash., D. C., to Q. C. Ballentine Co., 146 Washington Ave., Bridgeport***excavating, to Grasso Constr. Co., 2377 Main St., Bridgeport*** miscellaneous hardware, to W. Clinton Welch, 15 Main St., Westport***reinforcing steel and mesh, to J. T. Rygerson & Son, 203 Woodside Ave., Jersey City, N. J. Noted Dec. 18, C. D.—Dec. 26, E. N.-R., under "Contracts Awarded."

†Federal Government.

Public Buildings (Continued)

†**D. C., Wash.**—Treas. Dpt. at office Sup. Archt., Wash., D. C., sprinkler system in Internal Revenue Building, to Easthom-Melvin Co., Woodward Bldg., $13,640; furnishing, installing steel shelving on 6th floor of same building, to General Fireproofing Co., 201 Mills Bldg., $5,261. Bids Feb. 10. Noted Feb. 17, C. D.—**Feb. 6, E. N.-R.**

Ill., Chicago—Bd. Educ., masonry for 2 story, basement, 70x124 ft. school, 86th and Wood sts., to S. N. Nielsen Co., 3059 Augusta St., $36,225***steel lockers, to Durabilt Steel Locker Co., Aurora, $1,156***roofing, to Allendorfer Roofing Co., 2440 North Oakley Ave., $1,177***painting to L. Link, 8245 Ellis Ave., $3,095***tile, to Illinois Terrazzo & Tile Co., 53 West Austin Ave., $795***marble, to Italian Marble Co., 1730 Carroll Ave., $366***plumbing, to Pronger Constr. Co., 12940 South Western Ave., $7,098***heating, ventilating, and heat regulation, to Acme Heating & Ventilating Co., 4224 South Lowe Ave., $11,833***electrical work, to Wadeford Electric Co., 250 West Wacker Dr., $7,089***steel lockers for 2 story, basement, 70x124 ft. school, at 86th St. and Creiger Ave., to Lyon Metal Products Co., 222 North Bank Dr., $1,408***roofing, to Esko & Young, 44 North Washtensaw Ave., $1,332***carpentry, to Chell & Anderson, Inc., 176 West Adams St., $12,850***painting to J. B. Noelle Co., 808 North Franklin St., $3,533***tile, to Western Mosaic & Terrazzo Co., 4216 Ogden Ave., $785***marble, to Vermont Marble Co., 5535 North Lincoln St., $393***heating, ventilating and heat regulation to H. H. Davis Co., 4146 South Western Ave., $12,972***plumbing, to S. Kersten, 206 South Jefferson St., $7,165***electrical work, to L. H. Lamont Co., 9 South Clinton St., $7,731***carpentry for school at 86th and Wood Sts., and masonry for school at 86th and Crieger Ave., to Coath & Goss, Inc., 228 North LaSalle St., $11,400 and $41,800 respectively***fireproofing for both schools, to Illinois Fire Proofing Constr. Co., 241 East Ohio St., $6,645 and $7,480 respectively***sheet metal, to Luse-Stevenson Co., 228 North LaSalle St., $465 and $470 respectively***structural steel and iron, to Gage Structural Steel Co., 3141 South Hoyne Ave., $5,704 and $6,527 respectively***miscellaneous steel and iron, to Eggers Iron Co., 364 North Harding Ave., $1,990 and $1,990 respectively***glass and glazing, to American Glass Co., 1030 North Branch St., $1,180 and $1,385 respectively***plastering, to P. Bandow & Sons, 5040 South Elizabeth St., $4,200 and $4,724 respectively. Grand total $212,963. **P.W.A.** Bids Feb. 4. Noted Feb. 17, C. D.

Ill., Chicago—Dpt. P. Wks. & Buildings, Div. Architecture & Eng. Springfield, elevator equipment, for addition to orthopedic building, research and educa. hospital, 1819 West Polk St., to Montgomery Elevator Co., 30 20th St., Moline, $5,429. **Bids Jan. 3. Noted Dec. 30, C. D.**

†**Ill., Chicago** — Treas. Dpt. at office Sup. Archt., Wash., D. C., enclosing conveyors and chutes of U. S. Post Office, to Lamson Co., Eastwood, Syracuse, $21,459. Bids Jan. 30. Noted Jan. 23, C. D.

Ill., Normal—Dpt. P. Wks. & Buildings, Div. Architecture and Eng., Springfield, heating and plumbing for swimming pool addition at Children's School, to J. P. Shields, 214 West Monroe St., $5,667 and $9,697 respectively***wiring, to Wadeford Electric Co., 205 West Wacker Dr., Chicago, $7,264. Grand total $22,628. **P.W.A. Bids Feb. 15.**

Ill., Rock Island—Bd. Educ., plumbing for 3 and 4 story, 64x240 ft. Senior High School to Channon & Dufva Co., Rock Island, $47,465***heating, to Carstens Bros., Ackley, Ia., $97,668***electrical work, to Wadeford Electric Co., 205 West Wacker Dr., Chicago, $43,700. Grand total $188,833. **P.W.A.** Bids Dec. 10. Noted Dec. 27, C.D.—Jan. 2, E. N.-R., under "Contracts Awarded."

Ind., Kokomo—Comrs. Howard Co., general contract 3 story, basement, 100x150 ft., brick, steel court house, Public Square, to Buesching-Hagerman Corp., 402 East Superior St., Fort Wayne, $271,407***electrical wiring, to G. Martzloff, 203 East Main St., $5,347***heating and plumbing, to A. P. Rose, 908 West Jackson St., $37,684. Grand total $314,438. **P.W.A.** Bids Feb. 28, awarded Feb. 29. **Noted Jan. 29, C.D.—Feb. 6, E.N.-R.**

Mass., Billerica—G. L. and C. Co., general contractors, 40 Court St., Boston, heating and plumbing in dormitory house of correction, to S. J. Connolly, 2453 Washington St., Roxbury, for Comrs. Middlesex Co., Court House, East Cambridge***electrical work, to Warren H. Bennett Electric Co., 13 Forest St., Medford***structural steel erection, to O. H. Horovitz, 31 Montrose St., Newton***exterior and interior finish, to Dudley Milling Co., 46 Thayer St., Boston***woodwork, to F. H. Newton Co., 34 Cameron Ave., Cambridge***roofing, to A. Belanger & Son, 36 Brookford St., Cambridge***light iron, to C. Carlson Co., 62 Sudbury St., Boston***structural steel, to Groisser Schlager Iron Wks., 84 Wash St., Somerville***slate, to Slatecraft Co., 110 Terrace St., Roxbury***cast stone, to Eastern Cement Stone Co., Lynn St., Malden***waterproofing, to Travers Sandell, Inc., 238 Main St., Cambridge. **Noted Jan. 8, C. D.—Jan. 16, E. N.-R., under "Contracts Awarded."**

Mass., Boston—M. S. Kelliher Co., general contractors, 30 Chauncy St., Boston, heating for Lucy Stone School, Park St., Dorchester, to Jas. P. Sullivan Co., 3718 Wash St., Jamaica Plain, for City, Dpt. School Buildings, 11 Beacon St.***plumbing, to J. G. Gillespie Co., 708 Columbia Rd., Dorchester***electrical work, to M. B. Foster Electric Co., 514 Atlantic Ave., Boston***reinforcing steel, to Concrete Steel Co., 294 Wash St., Boston***structural steel and light iron, to United Steel Co., 10 Nashua St., Worcester***paint, to M. L. McDonald Co., 365 Albany St., Boston***doors, windows and finish, to Brockway Smith Haigh Lovell Co., 465 Medford St., Charlestown***terrazzo work, to De Paoli Mosaic Co., 126 Magazine St., Roxbury***marble tile and bluestone, to Colonial Marble Co., 141 A Gore St., Cambridge***granite, to Austin Ford & Son, Inc., 73 Main St., Cambridge***rock asphalt floors, to Interstate Flooring & Constr. Co., 75 Federal St., Boston***excavation, to R. E. Cuniff, 393 Brookline St., Newton***structural steel and reinforcing steel erection, to E. C. Magown, 320 Park Ave., Arlington. Noted Dec. 17, C. D. —Dec. 26, E. N.-R., under "Contracts Awarded."

Mass., Uxbridge—M. J. Walsh & Sons Constr. Co., general contractors, 1412 Dwight St., Holyoke, heating for high school addition, to Holyoke Supply Co., 310 Race St., Holyoke, for Town, J. A. Gillis, secy. Building Comm.***plumbing, to H. J. Lyons, 39 Melrose St., Boston***electrical work, to M. B. Foster Co., 368 Congress St., Boston***structural steel, to United Structural Steel Co., 10 Nashua St., Worcester***iron, to E. Van Noorden Co., 100 Magazine St., Roxbury***stone, to Sagamore Duntile Co., Sagamore***marble, to Pignat-Vicenzi Mosaic, Inc., 147 Orleans St., Boston**roofing, to Cavanaugh & Early, Inc., 39 Carleton St., Cambridge***painting, to M. L. McDonald Co., 365 Albany St., Boston***granite work to general contractors. Noted Feb. 5. C.D.—Feb. 13, E.N.-R., under "Contracts Awarded."

†**Minn., Cass Lake** — Dpt. Interior, Wash., D. C., Feb. 4, constructing hospital, to G. J. Grant, 893 Como Blvd., St. Paul, $95,866. Bids Feb. 4. **Noted Feb. 7, C. D.**

Mo., Koch—Bd. Public Service, City Hall, general contract 3 story, basement, 65x162 ft. ward building for Robert Koch Hospital, to H. B. Deal & Co., Inc., 1218 Olive St., $187,593***plumbing and drainage, to J. Sheehan Plumbing Co., 1609 Olive St., St. Louis, $13,575***heating, to Koppen-Smith Heating Co., 2628 Olive St., St. Louis, $18,624***electrical work, to E. A. Koeneman Electric Co., 1408 Delmar Blvd., St. Louis, $12,400***electric elevators, to Westinghouse Electric Elevator Co., 411 North 7th St., St. Louis, $12,727. Grand total $242,919. **P.W.A.** Bids Feb. 25. Noted Mar. 2, C. D.—Jan. 30, E. N.-R.

†**Mo., St. Louis**—U. S. Marine Hospital, 3640 Marine St., repairing buildings at U. S. Marine Hospital, to Brockmeyer-Bohle, Inc., Missouri Theatre Bldg., $2,428. Bids Jan. 28. Noted Feb. 24, C. D.

Mo., St. Louis—Bd. P. Serv., City Hall, clearing site and constructing foundations for National Guard Armory, Market St., between Prospect and Spring Aves., to L. E. Millstone Constr. Co., 4343 Clayton Ave., $7,878. **P.W.A.** Bids Feb. 18. Noted Feb. 24, C. D.—Feb. 20, E. N.-R.

Mo., St. Louis—City, Bd. P. Serv., City Hall, 1 story, 27x62 ft., brick, steel, iron, tile milk house at Bellefontaine Farms on Missouri River, day labor. V. P. Roach, supply comr., takes bids Mar. 11, for iron, steel, tile and brick for same. W. C. E. Becker, city engr. A. Osburg, city archt.

Mo., University City—Woermann Constr. Co., general contractors, 3800 West Pine Blvd., St. Louis, setting cut stone for 2 story, basement, 80x132x100x40 ft. and 1 story, basement, 38x93 ft. addition and auditorium for Senior High School, Jackson and Balson Aves., for Bd. Educ., 6701 Delmar Blvd., to Walker Bros. Stone Co., Bloomington, Ind.***setting stone, to Pickel Stone Co., 1320 South Vandeventer St., St. Louis***brick and hollow tile, to Mackensen Constr. Co., 425 Oakley Dr., St. Louis***iron and steel, to LaSalle Iron Wks., 3110 LaSalle St., St. Louis***metal lathing and plastering, to H. Niehaus Plastering Co., 317 North 11th St., St. Louis***sheet metal work to Mound Rose Cornice & Sheet Metal Wks., 726 North Euclid St., St. Louis***tile roofing, to P. S. Naughton, 1431 Cora St., St. Louis***composition roofing, to Swift Roofing Co., 3829 West Pine St., St. Louis***terrazzo, to Missouri Terrazzo Co., 3859 Delmar St., St. Louis***linoleum floors, to Floor Wall Corp., 1530 Olive St., St. Louis***marble and tile to T. J. McGarry Co., 3439 Pine St., St. Louis***glazing, to Nurre Companies, 3815 Laclede St., St. Louis***painting, to A. K. Koedding, Jr., 5611 Wabada St., St. Louis***finish hardware, to Shapeligh Hardware Co., 315 Washington St., St. Louis***excavating, for Jackson Park Grade School, Jackson and Balsam Aves., to Carlo Motor Service Co., 4126 Olive St., St. Louis***furnishing stone, to Walker Bros. Stone Co., Bloomington, Ind.***setting stone, to Pickel Stone Co., 1320 South Vandeventer St., St. Louis***brick and hollow tile, to Mackensen Constr. Co., 424 Oakley Dr., St. Louis*** iron and steel, to Kaysing Iron Wks., 2701 North 25th St., St. Louis***metal lathing and plastering, to H. Niehaus Plaster Co., 317 North 11th St., St. Louis*** sheet metal, to Mound Rose Cornice & Sheet Metal Wks., 726 North Euclid St., St. Louis*** tile roofing, to P. S. Naughton Slate Roofing Co., 1431 Cora St., St. Louis***composition roofing, to P. W. Finger Roofing Co., 3448 Morganford St., St. Louis***terrazzo, to Missouri Terrazzo Co., 3859 Delmar St., St. Louis***linoleum floors, to Hamilton Co., Inc., 4239 Lindell St., St. Louis***marble work, to Bradbury Marble Co., 3401 Morganford St., St. Louis***tile work, to T. J. McGarry Co., 3439 Pine St., St. Louis***glazing, to Pittsburgh Plate Glass Co., 3900 Chouteau St., St. Louis*** plastering, to Mecher Schene Hardware Co., 4800 Natural Bridge Ave., St. Louis***painting, to J. S. Dowling Co., Inc., 2233 Franklin St., St. Louis***plumbing, to W. L. Clucas & Co., 11 North Grand St., St. Louis***heating and ventilating, to Eichler Heating Co., 2125 Locust St., St. Louis***electrical work, to E. A. Koeneman Electric Co., 1408 Delmar St., St. Louis. **P.W.A.** Noted Feb. 1, C. D.—Feb. 20, E. N.-R., under "Contracts Awarded."

†**Mont., Browning**—Indian Bureau, Dpt. Interior, Wash., D. C., constructing Blackfoot Hospital Building, to F. R. Comb Co., 211 Chicago Ave., Minneapolis, Minn., $107,660. Bids Feb. 6.

†**Mont., Crow Agency**—Dpt. Interior, Purchasing Officer, Wash., D. C., constructing hospital, to Ring Constr. Co., 1645 Penn Ave., Minneapolis, Minn., $146,500. Bids Feb. 6. Noted Jan. 9, C. D.—Jan. 16, E. N.-R.

Neb., Chadron—Dawes Co., plumbing, heating and ventilating for court house, to G. H. Wentz, Inc., 1309 N St., Lincoln, $11,100. **P.W.A.** Bids Nov. 30. Noted Mar. 3, C. D.—Mar. 5, E. N.-R.

Neb., Chadron—Dawes Co., electrical wiring for 3 story, 60x180 ft., rein.-con., brick, stone court house, to R. G. Smith, Chardon, $1,385. **P.W.A.** Bids Jan. 30. Noted Mar. 3, C. D.—Mar. 5, E. N.-R., under "Contracts Awarded."

†**N. J., Atlantic City**—Treas. Dpt. at office Sup. Archt., Wash., D. C., furnishing, installing 1 freight elevator in U. S. Post Office, to Warsaw Elevator Co., 220 South Main St., Warsaw, N. Y., $5,453. Bids Feb. 6. Noted Feb. 10, C. D.—Jan. 23, E. N.-R.

†**N. Y., Buffalo**—Treas. Dpt. at office Sup. Archt., Wash., D. C., elevator plant in U. S. Court House, to Haughton Elevator & Machine Co., 2117 West K St., $75,714. Bids Feb. 25. Noted Mar. 3, C.D.—Feb. 6, E.N.-R.

N. Y., Corfu—Sycamore Lumber & Mill Co., general contractors, 35 Lathrop St., Buffalo, cut stone for school for Union Free School Dist. 7, to Hawkins & Howlett, 243 Capen Blvd., Buffalo***structural steel, to Ernst Iron Wks., 75 Lathrop St., Buffalo***mill work, to Neubecker Lumber Corp., 243 French St., Buffalo. **P.W.A.** Noted Jan. 3, C. D.—Jan. 9, E. N.-R., under "Contracts Awarded."

N. Y., Gowanda—Lakeland Eng. & Constr. Corp., general contractors, Electric Bldg., Buffalo, metal lathing and plastering for school for Union Free School Dist. 1, to G. E. Hudson Corp., Crosby Bldg., Buffalo; cast stone, to Buffalo Cast Stone Co., 180 Colgate Ave., Buffalo. **P.W.A.** Noted Dec. 11, C. D.—Dec. 19, E. N.-R., under "Contracts Awarded."

N. Y., Grand Island—Sycamore Lumber & Mill Co., general contractors, 35 Lathrop St., Buffalo, structural steel for school, Base Line Rd., for Bd. Educ., Grand Island, to Ernst Iron Wks., 75 Lathrop St., Buffalo***roofing, to Reiber Roofing Co., 83 Doat St., Buffalo*** cut stone, to Hawkins & Howlett, 243 Capen Blvd., Buffalo. **P.W.A.** Noted Jan. 22, C. D. —Jan. 30, E. N.-R.

†**N. Y., New York**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing elevator in Post Office Station D, to Gurney Elevator Co., 109 West 64th St., $9,330. Bids Feb. 20. **Noted Feb. 24, C. D.—Jan. 30, E. N.-R.**

†**N. Y., New York**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing special lighting fixtures for U. S. Court House, to Metalcrafts, 712 Reading Rd., Cincinnati, O., $71,849. Bids Jan. 31.

N. Y., New York—Dpt. Parks, Arsenal Bldg., 2 story, 59x242 ft., brick, granite, rein.-con. recreation building, Reservoir Oval and Central Park, relief labor. $260,000. A. Embury, 2nd, c/o owner, archt. Owner taking bids on materials.

N. Y., Spencer—See "Bids Asked."

N. Y., Watervliet—Bd. Educ., constructing rein.-con. underpass for high school under 14th St., to Kuchar Bros., Montvale. **P.W.A.** Former contract rescinded. Noted Jan. 16, C. D.—Jan. 23, E. N.-R., under "Contracts Awarded."

N. Y., Wellsville—L. C. Whitford, general contractor, Wellsville, painting memorial library, Pearl and Main Sts., for David A. Howe Public Library Bd., to Seebach-Kimble, Inc., 330 St. Paul St., Rochester; plastering, to W. Seitz, 45 Avery Pl., Buffalo. Total est. $250,000. C. C. Ade, 52 James St., Rochester, archt.

†**N. C., Cherokee**—Dpt. Interior, Indian Bureau, Wash., D. C., constructing hospital building, to R. M. Lee, 250 Ivy St., Atlanta, Ga., $76,410. Bids Feb. 7. Noted Feb. 17, C. D.—Jan. 16, E. N.-R.

†**N. C., Wilmington**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to A. Blair, 1st Natl. Bank Bldg., Montgomery, Ala., $249,436; elevator, to Salem Fdry. & Machine Wks., Inc., Salem, Va., $3,192. Bids Mar. 5. Noted Feb. 10 and 18 C. D.—Feb. 13 and 20 E. N.-R.

†**N. C., Wilmington**—Treas. Dpt. at office Sup. Archt., Wash., D. C., remodeling certain spaces in Court House, Appraisers Stores, and Custom House for use as temporary post office, to Vanguard Constr. Co., 11 West 42nd St., New York, $5,872. Bids Feb. 24. Noted Feb. 8, C. D.—Feb. 13, E. N.-R.

N. D., Grand Forks—Bd. Educ., general contract 3 story, 72x147 ft. school addition, to McGough Bros., 1954 University Ave., St. Paul.

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†*Federal Government.*

Public Buildings (Continued)

Minn., $182,280***heating and plumbing, to D. W. Hickey Co., 1631 University Ave., St. Paul, Minn., $30,016***wiring, to Electric Constr. Co., Grand Forks, $14,048. Grand total $226,334. **P.W.A.** Bids Feb. 19. Noted Feb. 6, C. D.

†Oregon—U. S. Eng., Pittock Bldg., Portland, constructing station building and sewerage system at Bonneville, to Orino Berkemeir & Saremal, Bonneville, $25,676. Bids Feb. 25. Noted Feb. 17, C.D.

†Pa., Easton — Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office, to A. Christensen, 80 Broad St., Elizabeth, N. J., $156,620. Bids Jan. 28. Noted Feb. 3, C. D.—Jan. 9, E. N.-R.

Pa., Franklin—Bd. Educ., general contract 2 story and part basement, 86x175 ft., brick, steel Junior High School, to C. Shutrump & Son, 10 West Hylda St., Youngstown, O., alternate $183,492***plumbing, to F. C. Patterson, Bradford, $10,165***heating, to W. M. Clark, 295 South Beaver St., New Castle, $24,955*** electrical work, to Marvin Electric Co., New Castle, $11,175. Grand total $229,787. **P.W.A.** Noted Feb. 28, C. D.—Mar. 5, E. N.-R.

S. C., State Park—J. A. Hayne, secy. State Bd. Health, Columbia, constructing (1st unit) of hospital building for South Carolina Tuberculosis Sanatorium, State Park, to J. J. McDevitt Co., Builders Bldg., Charlotte, N. C., $63,322. Bids Feb. 26, awarded Feb. 26. Noted Feb. 18, C. D.—Feb. 20, E. N.-R.

†S. D., Crow Creek—Indian Bureau, Dpt. Interior, Wash., D. C., constructing hospital building, to F. R. Comb Co., 211 Chicago Ave., Minneapolis, Minn., $116,628. Bids Feb. 8. Noted Feb. 17, C. D.

†S. D., Yankton—Indian Bureau, Dpt. Interior, Wash., D. C., constructing hospital building, to W. C. Smith, 311 Builders Exch. Bldg., Duluth, $92,972. Bids Feb. 8. Noted Feb. 17, C. D.

★ **†Tex., Dallas**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing **U. S.** Parcel Post Building, to A. J. Rife Constr. Co., 1913 North Harwood St., Dallas, $591,700. Bids Feb. 17. Noted Feb. 19, C. D.—Jan. 30, E. N.R.

†Tex., Dallas—U. S. Government, c/o Texas Centennial Central Exposition, Inc., general contract 1 story federal centennial building, Centennial Grounds, to J. J. Fritch, Thomas Bldg., $146,000. Bids soon on mechanical trades. Noted Feb. 28, C. D.

★ **Tex., Houston**—Houston Ind. School Dist., c/o H. L. Mills, bus. mgr., constructing East End High School, to Southwestern Constr. Co., 3800 Clay Ave., $485,000***Sutton Elementary School addition and alterations, Rosedale Ave., and Cleveland Elementary School addition, 320 Jackson Hill, to Russell-Brown Co., 3104 Main St., $50,726 and $23,306 respectively***Briscoe Elementary School Addition, Forest Hill Dr., to W. J. Groggan, 1116 Banks St., $23,338***Reagan High School addition, 13th and Arlington Sts., and Irvington School, to Kronzer Const. Co., Merchants Exchange Bldg., $83,744 and $33,159 respectively ***shop building and addition to Taylor School, to Knutson Constr. Co., Union Bank Bldg., $57,922. Grand total $757,195. **P.W.A.**

†Tex., Laredo—Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Court House and Custom House, to R. P. Farnsworth, 212 Nashville Ave., New Orleans, La., $254,540. Bids Feb. 28. Noted Mar. 4, C. D.

Tex., Houston—J. T. Taylor, general contractor, 605 1st Natl. Bank Bldg., Fort Worth, heating for nurses' home, for City-County, c/o O. F. Holcomb, mayor, to Young & Pratt, Austin, $13,500***plumbing, to Jud & Ormond, 703 North Flores St., San Antonio, $41,390 ***electric wiring, to Eugene Ashe Electric Co., 505 Jones St., Fort Worth, $11,100***elevator, to Westinghouse Electric Elevator Co., Sterling Bldg., $69,700. Grand total $135,690. **P.W.A.** Noted Feb. 28, C. D.—Mar. 5, E. N.-R., under "Contracts Awarded."

Tex., Houston—Houston Ind. School Dist., c/o H. L. Mills, bus. mgr., 1 and 2 story, brick, rein.-con. addition to San Jacinto High School, San Jacinto and Holman Sts., to N. Wohlfeld, Construction Bldg., Dallas, $233,025. **P.W.A.**

Tex., Houston—N. Wohfield, general contractors, 411 Construction Bldg., Dallas, plumbing, heating and ventilating for Southwest High School, for Houston Ind. School Dist., c/o H. L. Mills, bus. mgr., 1600 Washington St., to Barber Plumbing Co., 1419 Page St.***electric wiring, to Martin Wilder Co., P. O. Box 2538 ***cut stone, to South Texas Stone Co., 312 Schrimpl St.***structural and reinforcing steel, to Mosher Steel Co., P. O. Box 338***metal windows, to Truscon Steel Co., 731 M and M Bldg.***removable metal forms, to Concrete Eng. Co., P. O. Box 1311***waterproofing, to A. M. Bowles, Post Dispatch Bldg. **P.W.A.** Noted Feb. 13, C. D.—Feb. 20, E. N.-R., under "Contracts Awarded."

†Va., Roanoke — Vet. Bu., Arlington Bldg., Wash., D. C., constructing Infirmary Building 12, connecting Corridor 5-12, incl. plumbing, heating, electrical work, to North-Eastern Constr. Co., 810 Misson Bldg., Winston, Salem, N. C., $311,844; electric elevator in Infirmary Building 12, to Salem Fdry. & Machine Wks., Inc., Salem, $6,795. Bids Feb. 11. Noted Feb. 14, C. D.—Jan. 16, E. N.-R.

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†Wis., Kaukauna—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to C. Bloss & Sons, 901 4th Ave. W., Washland, $44,133. Bids Feb. 11. Noted Feb. 17, C. D.—Jan. 23, E. N.-R.

Ont., Forest Hill—Forsey Page & Steele, archts., 20 St. Clair Ave. W., Toronto, general contract 1 story, basement, 50x200 ft., brick, steel public school, plain found., Spadina Rd. N., for Forest Hill School Bd., to Dickie Constr. Co. Ltd., 17 Yorkville St., Toronto; plumbing and heating, to Bennett & Wright Co. Ltd., 72 Queen St. E., Toronto. Est. $150,000. Noted Feb. 18, C. D.

COMMERCIAL BUILDINGS

PROPOSED WORK

Calif., Los Angeles—Charles S. and J. Crail, Bartlett Bldg., plan 5 story, Class A building, Wilshire Blvd. and St. Paul Ave., to be occupied by Woodbury College. $200,000. Architect not appointed.

★ **Calif., Pasadena**—Collis P. and Howard Huntington Memorial Hospital Bd. of Trustees, C. H. Holladay, 1125 Rosalind Rd., San Marino, plans about 5 story, Class A hospital, 749 Fairmont St. $500,000. Architect not appointed.

Calif., San Francisco—Western Furniture Exchange, 180 New Montgomery St., plans furniture exchange and offices. To exceed $150,000. Architect not appointed.

Conn., New London—Connecticut College for Women, Katherine Blunt, pres., plans by Shreve, Lamb & Harmon, 11 East 44th St., New York, 3 story, brick, steel, stone dormitory for 75 students. $160,000.

★ **Me., Waterville**—Colby College, **F. Johnson**, pres., plans by J. F. Larson, 27 East Wheelock St., Hanover, N. H., several buildings, incl. administration, dormitories, laboratories, etc., Mayflower Hall. $5,000,000. Will probably advance in 1937.

Md., Baltimore — Johns Hopkins University, North Charles St., plans nearing completion by Wrenn, Lewis & Jencks, 113 West Mulberry St., 3 story, brick, stone, steel, concrete university structure.

Mass., Cambridge—Society of St. John the Evangelist, S. Barton, pastor, Memorial Dr., plans by Cram & Ferguson, 248 Boylston St., Boston, 2 story, basement, brick, steel, stone, granite monastery and chapel, concrete found., on Memorial Dr. To exceed $140,000. Buerkel & Co., Inc., 24 Union Park St., Boston, Mass., engrs.

Mass., Quincy—Bethlehem Ship Building Corp., East Howard St., Quincy, soon lets contract 4 story, brick, steel, stucco office building addition. $140,000. Private plans.

Minn., Minneapolis — Covenant Tabernacle Church of Minneapolis, G. F. Johnson, 1502 10th Ave. S., plans by Lang & Raugland, 412 Essex Bldg., 2 or 3 story, 69x138 ft., rein.-con., brick, cut-stone bible institute, 812-816 South 7th St. $150,000.

★ **N. J., Newark**—St. Barnabas Hospital and Women's and Children's Hospital, High St., plans by J. H. and W. C. Ely, 744 Broad St., new hospital building on present site. Est. about $500,000.

N. J., Teaneck—Kings Builders, Inc., Lawnside Terrace, plans (2nd unit), group of brick dwellings on Lawnside Terrace. To exceed $140,000.

N. Y., Brooklyn—Corporation, c/o W. McMeekan, 600 West 144th St., New York, plans 6 story, brick apartment, Lawrence and McDonald Aves. $150,000. Architect not appointed.

N. Y., Buffalo—Memorial Hospital, 742 Jefferson Ave., plans nearing completion by F. J. and W. A. Kidd, 524 Franklin St., constructing brick, steel memorial hospital, plain found., 742 Jefferson Ave. $125,000-$150,000. Will apply for federal funds. Noted Apr. 5, 1934, E. N.-R.

N. Y., Elmhurst—Curtis X Mathews Co., Lincoln and Roosevelt Aves., Woodside, plans group 2 story, brick dwellings, Calamus and Ankerner Aves. $250,000. Private plans.

N. Y., Forest Hills—Kent Homes, Inc., 66-72 Fresh Pond Rd., Ridgewood, plans by A. E. Allen, Garden City, constructing (2nd unit), group dwellings, Fleet St. near Baldwin Ave. $140,000.

N. Y., Freeport—Lewis Land Corp., Little Neck, plans constructing group frame and brick dwellings, and tract development, Merrick Rd. To exceed $150,000. Site acquired.

★ **N. Y., Greenburgh**—Mayfair Acres, Greenburgh, G. A. Feuerstein, in charge, plans constructing 100 additional residences, incl. air condition system. To exceed $500,000. Private plans.

N. Y., Jackson Heights—Filldor Realty Corp., E. Scarpinate, 29-20 Butler St., Elmhurst, plans by Morris Rothstein, 391 Fulton St., Brooklyn, 6 story, brick apartment, 72nd St. and 35th Ave. $170,000.

N. Y., New Rochelle—Haring & Blumenthal Realty Corp., 755 7th Ave., New York, plans constructing group frame dwellings and developing 54 acre tract, Wilmot Rd. To exceed $250,000. Architect not appointed. Site acquired.

N. Y., New York — Metropolitan Savings Bank, 754 Bway., plans by A. A. Tearle, 10 West 46th St., altering heating, plumbing in 6 story apartment, 348 East 3rd St. $37,000 with fixtures.

N. Y., New York—Milhern Estates, c/o N. and S. Whinston, archts. and engrs., 2 Columbus Circle, altering heating, plumbing, incinerator in apartment, 24th St. and 2nd Ave. $45,000.

N. Y., New York—American Radiator Co., 40 West 40th St., plans constructing showroom, 46 West 40th St. $140,000. Site acquired.

N. Y., New York—Corporation, c/o J. A. Tishman, 136 East 57th St., plans 12 story office, 19 Cliff St. To exceed $150,000. Site acquired.

N. Y., New York—Estate of L. M. Bates, c/o B. L. Kraus, 36 West 44th St., altering heating, plumbing in 7 story Murray Hill Hotel, Park Ave. and 41st St. To exceed $50,000.

N. Y., New York—Forty-Seven East 57th St. Corp., S. Minskoff, pres., 521 5th Ave., plans by Boake & Paris, 101 Park Ave., 11 story apartment, 50 East 78th St. $150,000.

N. Y., New York—Forty-Six East 78th Street Corp., P. Wellins, in charge, 521 5th Ave., plans 12 story apartment, 46 East 78th St. To exceed $150,000.

N. Y., New York—International Mercantile Marine, 11 Bway., plans by P. H. Gobel, c/o owner, altering plumbing, heating in 12 story office, 1 Greenwich St. $37,000 or more with fixtures.

N. Y., New York — F. Heidelgerber, 2308 University Ave., plans by S. V. Becker, 384 East 149th St., 6 story, brick apartment, 149th St. and University Ave. $140,000.

N. Y., New York—Fifty Park Terrace West Corp., c/o J. P. Day, 67 Liberty St., plans by Miller & Goldhammer, 40 East 49th St., constructing 6 story apartment, West 215th St. and Park Terrace. $150,000.

N. Y., New York—New York Savings Bank, 81 8th Ave., plans by T. O. Raad, c/o owner, altering heating, plumbing in 6 story apartments, 540 West 165th St. $70,000 with fixtures.

N. Y., New York—One Park Ave., Inc., 1 Park Ave., plans by J. D. Weiss, 119 West 57th St., altering heating, plumbing, mechanical equipment in 19 story office and store, 1 Park Ave. $65,000.

N. Y., New York—One Thousand Six Hundred Two 2nd Avenue Holding Corp., 3030 Arlington St., plans by J. Schafran, 441 East Tremont Ave., altering heating in 5 story apartment, 1602 2nd Ave. $37,000 with fixtures.

N. Y., New York—Seventy-Seven Cooper Street Corp., L. A. Minskoff, pres., 77 Cooper St., plans by Boake & Paris, 101 Park Ave., 6 story, brick apartment, 77 Cooper St. $150,000.

N. Y., New York—Parkteen Constr. Corp., 349 East 149th St., plans by C. Kreymborg, 349 East 149th St., 6 story, 80x100 ft. apartment, 97-103 East 116th St. $140,000.

★ **N. Y., New York**—St. Luke's Hospital, 417-421 114th St., plans by York & Sawyer, 100 East 42nd St., 12 story, 100x200 ft. pavilion-house nurses residence and school, 417-421 West 114th St. and 414-421 West 115th St. $1,200,000.

N. Y., New York—Raleigh Apartments, Inc., 324 East 196th St., plans by C. Kreymborg, 349 East 149th St., 6 story apartment, Davidson Ave. and 190th St. $280,000.

N. Y., New York—Ramapo Estates, 182 West Fordham Rd., plans by G. G. Foster, 501 5th Ave., group 2 story, brick dwellings, Tibbett Ave. near 232nd St. $140,000.

N. Y., New York—Story Realty Corp., 2320 Westchester Ave., plans by I. L. Crausman, 332 East 149th St., 6 story, brick apartment, Gleason near Castle Hill Aves. Est. about $140,000.

N. Y., New York—Sadie K. Zinman, 258 Bway., plans by A. J. Simberg, 31 Union Sq., altering heating, plumbing in apartment, 118 East 91st St., Est. about $40,000 with fixtures.

N. Y., Oswego—Oswego-Strand Corp. plans constructing Strand Theatre. $150,000. W. M. Powers, resident mgr.

N. Y., Oswego—Schine Chain Theatre Corp., 40 West Main St., Gloversville, plans by P. M. Hulsken & L. T. Strong, 505 Savings Bank Bldg., Lima, O., remodeling theatre into department store and constructing new modern theatre at new location. To exceed $140,000.

N. Y., Richmond Hill—A. Gallo, 127-05 Merrick Rd., Springfield, plans by Lama & Proskauer, 383 Jay St., Brooklyn, constructing group frame dwellings. $140,000.

O., Cleveland—Reserve Underwriters, E. Sanford, pres., 605 Swetland Bldg., receiving sketches from architects for one hundred 1 and 1½ story houses. $3,500 each.

O., Cleveland—Metropolitan Better Homes Building Co., W. W. Frick, 4020 West 219th St., making plans twenty 2 story, brick, frame houses. $7,500 each. Private plans.

O., Steubenville—Fort Steubenville Hotel, G. A. Gescheider, pres. Bd. Directors, plans installation of 150 hp. high pressure water tube boiler, complete with stoker, mono-rail, steam driven boiler feed pump, etc., in boiler room of hotel. R. Brauer, 1101 Bessemer Bldg., Pittsburgh, Pa., engr.

O., Warren—Hotel Warren Co., Hotel Warren, plans hotel and stores. Est. about $140,000. **Maturity indefinite.**

Pa., Cambridge Springs—Alliance College, M. B. Steczynski, genl. mgr., plans brick, steel

†Federal Government.

Commercial Buildings (Continued)

Administration building and dormitory, on campus. Architect not appointed.

Pa., Pen Argyl—Pen Argyl National Bank plans office building. Est. about $140,000. **Maturity indefinite.** Architect not appointed.

R. I., Warrick—A. J. Murphy, archt., 25 Penner St., Providence, rejected bids Feb. 21, 2½ story, basement, 50x100 ft. church, Fair St., for St. Peter's Parish, Rev. P. W. McHugh, pastor, 112 Fair St. May readvertise. Noted Feb. 17, C. D.—Feb. 21, E. N.-R.

★ **Que., Nicolet**—Roman Catholic College of St. Nicolet making plans by D. Deschaies, constructing addition to Roman Catholic College. $800,000.

Que., Quebec City — Roman Catholic School Comm., J. E. Bedara, chn., takes bids late in March, constructing 3 story fireproof school. $160,000.

BIDS ASKED

Calif., Claremont—Pomona College, 3rd St., taking bids from selected list of bidders, 2 and 3 story, women's dormitory, rein.-con., 3rd St. $230,000. Allison & Allison, 1014 Edison Bldg., Los Angeles, archts. Noted Jan. 6, C.D.—Jan. 9, E.N.-R.

N. H., Concord — Mar. 24, by St. Paul's School, 3 story, basement, school. $300,000. James Gamble Rogers, 154 East 46th St., New York, archt.

N. Y., Bayside—See "Contracts Awarded."

N. Y., Flushing—See "Contracts Awarded."

N. Y., Manhasset—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

CONTRACTS AWARDED

Conn., Bridgeport—St. Anthony Parish, A. A. Jalbert, pastor, 2 story, basement, 50x80 ft. and 30x65 ft., brick, stone, steel parochial school and convent, connected with enclosed passage, Colorado Ave., to Hewlett Co., 1385 Iranistan Ave. Est. $140,000. Bids Feb. 20, awarded Mar. 2. Noted Feb. 17, C. D.—Feb. 20, E. N.-R.

N. J., Ridgewood—American Home & Community Building Corp., Hillcrest Rd. and Monroe St., constructing group of brick dwellings, Hillcrest Rd. and Monroe St., day labor and separate contracts. $140,000. Private plans. Owner will purchase materials. Noted Feb. 13, C. D.—Feb. 20, E. N.-R.

N. Y., Bayside—Gross-Morton Corp., 160-16 Jamaica Ave., Jamaica, constructing store and apartment, 48th Ave. and 123rd St., day labor and separate contracts. $140,000. A. E. Allen, Garden City, archt.

N. Y., Brooklyn—Dime Savings Bank of Williamsburg, 209 Havemeyer St., altering heating, plumbing in two 4 story apartments, 234 Linden Blvd., separate contracts. Est. about $37,000 with fixtures. B. Sackheim, 516 Avenue L, archt. Noted Feb. 7, C. D.—Feb. 13, E. N.-R.

N. Y., Brooklyn—Argent Realty Corp., 190 East 17th St., constructing 6 story, brick apartment, 189 East 18th St., separate contracts now being awarded. $140,000. Cohn Bros., 191 Joralemon St., archts. Noted Feb. 6, C. D.—Feb. 13, E. N.-R.

N. Y., Flushing—Supro Homes, Inc., Nassau Blvd. and Main St., constructing group brick dwellings, Nassau Blvd. and Main St., day labor and separate contracts. To exceed $150,000. Noted Feb. 3, C.D.—Feb. 6, E.N.-R.

N. Y., Jackson Heights—Jacksonian Apartments, Inc., 1935 66th St., Brooklyn, constructing 6 story apartment, 87th St. and 35th Ave., separate contracts now being awarded. $150,000. Cohn Bros., 191 Joralemon St., Brooklyn, archt. Noted Feb. 5, C. D.—Feb. 13, E. N.-R.

N. Y., Manhasset—Levitt & Sons, Northern Blvd., constructing (3rd unit), brick, frame dwellings, tract development, Northern Blvd., day labor and separate contracts. To exceed $250,000. Private plans. Noted Jan. 16, C. D.—Jan. 23, E. N.-R.

★ **N. Y., New York**—Absar Realty Co., 1457 Boscobel Ave., constructing 6 story apartment, 254th St. and Fieldson Rd., separate contracts now being awarded. $500,000. C. Kreymborg, 349 East 149th St., archt. Noted Feb. 5, C. D.—Feb. 13, E. N.-R.

N. Y., New York—Bijou Realty Corp., c/o M. Rosenfeld, 264 West 35th St., 6 story, brick apartment, 232nd St. and Riverdale Ave., separate contracts now being awarded. $250,000. A. Weiser, 240 Madison Ave., archt.

N. Y., New York—Darvo Realty Corp., 291 East 134th St., constructing 6 story apartment, 180 Bennett Ave., separate contracts now being awarded. $200,000. G. G. Miller, 40 East 49th St., archt. Noted Feb. 3, C. D.—Feb. 6, E. N.-R.

N. Y., New York—Eastminster Realty Corp., 978 2nd Ave., altering heating, plumbing in 5 story apartment, 313 East 46th St., separate contracts now being awarded. $37,000 with fixtures. Private plans. Noted Feb. 5, C.D.—Feb. 13, E.N.-R.

N. Y., New York—Ellen W. Realty Corp., 153½ Stanton St., altering heating, plumbing in two 5 story store and apartments, 371 Bleecker St., day labor. $37,000 or more. S. Roth, 305 Bway., archt. Noted Feb. 3, C.D.—Feb. 6, E.N.-R.

N. Y., New York—W. A. Kimball, 15 East 69th St., altering heating, plumbing in 5 story apartment, 17 East 60th St., separate contracts. $40,000. W. F. Schorn, c/o owner, archt. Noted Feb. 5, C. D.—Feb. 13, E. N.-R.

Federal Government.

N. Y., New York—Immigrant Industrial Savings Bank, 51 Chambers St., altering heating, plumbing in 10 and 13 story hotel, 122 West 49th St., to Robert Glenn, Inc., 101 Park Ave. Est. $40,000 with fixtures. Noted Jan. 29, C. D.—Feb. 6, E. N.-R.

N. Y., New York—Manhattan Savings Institution, 154 East 86th St., altering heating, plumbing in two 5 story apartments, 63 West 131st St., separate contracts. Est. about $40,000. F. B. A. Ware, c/o owner, archt. Noted Feb. 6, C. D.—Feb. 13, E. N.-R.

★ **N. Y., New York**—St. Lukes Hospital, 417-421 West 114th St., constructing 12 story, 100x200 ft. nurses' home, 417-421 West 114th St., to Mare Eidlitz & Son, Inc., 110 East 42nd St. Est. $1,200,000. Noted Mar. 5, C. D.

N. Y., New York—T. G. R. Construction & Realty Corp., 1450 Bway., 6 story, brick, 85x145 ft. apartment, Cooper St. and 204th St., separate contracts. $250,000. Miller & Goldhammer, 40 East 49th St., archts.

O., Cleveland—Ohio Bell Telephone Co., G. A. Kositzky, ch. engr., 750 Huron Rd., 3 story, basement, brick, rein.-con., 107x113 ft., telephone exchange building, East 107th St. and Wilbur Ave., to Lundoff-Bicknell Co., Terminal Tower. Awarded Feb. 27. Noted Jan. 22, C. D.—Jan. 30, E. N.-R.

O., Steubenville—Ohio Power Co., Newark, O., general contract 4 story, basement, brick, steel office building, to Hawkins Constr. Co., Newark, $150,000. Private plans.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., Beverly Hills—FACTORY—Payne Furnace & Supply Co., 338 North Foothill Rd., plans completed by W. J. Gage, 468 North Camden Dr., and soon takes bids 78x150 ft. addition to factory, 2 story, 42x72 ft., administration building and 338 North Foothill Blvd. To exceed $37,500.

Calif., Los Angeles—MARKET, etc.—Broadman Development Co., plans by Morgan, Walls & Clements, Van Nuys Bldg., 125x145 ft., concrete, steel, rein.-con. market and store, 8721-35 South Broadway. $50,000.

Calif., San Diego—FACTORY—Consolidated Aircraft Corp., making plans 1 story, 2 mezzanine floor, 200x200 ft., and 100x125 ft. wings, manufacturing and engineering building, steel frame structure, corrugated iron sides and roof, steel sash, concrete foundations and floors, rolling doors each 13x40 ft., electrical work, floor area totalling about 93,000 sq.ft., 3302 Atlantic St. To exceed $150,000. Taylor & Taylor, engrs. and archts., 802 West 3rd St., Los Angeles, taking bids structural steel.

Calif., Stockton — CANNERY — Flotill Products, Inc., Fresno and South Aves., plans automatic canning plant addition, and installing automatic canning equipment, Fresno and South Aves. Est. $75,000 without equipment. Architect not appointed.

Calif., Ukiah—WINERY—Interests in a cooperative proposal headed by J. Gherlone and E. Venturi, Ukiah, plans winery. $50,000 incl. equipment. Financing now being arranged.

Conn., Greenwich — BAKERY, etc. — Owner, c/o Cushman's Bakery Sons, 157 Greenwich St., and 1860 Broadway, New York, plans bakery, storage and store, 157 Greenwich St. or other location. Est. about $37,000. Architect not appointed. **Maturity indefinite.**

Ill., Chicago—PLANT—Chicago Flexible Shaft Co., 5600 West Roosevelt Rd., soon lets contract constructing 2 story, 83x300 ft., brick mill addition, plain found., 5600 West Roosevelt Rd.

Ill., Summit—PLANT—L. A. Young Spring & Wire Co., 6601 South Oak Park Ave., plans plant addition, 6601 South Oak Park Ave. Architect not appointed.

Ind., Anderson—PLANT—Howe Fire Apparatus Co. purchased the former Hill Standard plant and plans altering same. Will not construct new building. Noted Feb. 13, C. D.—Feb. 20, E. N.-R.

Ind., Indianapolis—PLANT—Indiana Wheel & Rim Co., North Illinois St., plans plant repairs. To exceed $40,000 with equipment. Architect not appointed.

Ind., Indianapolis—FERTILIZER WORKS—Rauh & Sons, Union Stockyards, Indianapolis, plans constructing fertilizer works, Union Stockyards. To exceed $40,000. Architect not appointed.

La., Lewis—CRACKING UNIT—Shoreline Refining Co., Shreveport, plans cracking unit (oil refinery). $200,000.

Me., Lewiston—STORAGE DISTRIBUTION, etc.—F. W. Woolworth Co., 299 Bway., New York, plans by A. F. Winters, assoc. archt., 299 Bway., New York, storage distribution and store. To exceed $100,000.

Mass., Boston—GARAGE—Railway Express Co. R. W. Thompson, supt. Buildings, 219 East 42nd St., New York, soon lets contract rebuilding garage from present garage and stable, Congress St. $250,000. Private plans.

Mass., Fall River — GARAGE — Fall River Properties Corp., c/o D. Shapiro, archt., 58 Weybosset St., Providence, R. I., altering factory building into public garage, Pleasant St. To exceed $37,000.

Mass., Lynn—BOILER HOUSE—Stone & Webster Eng. Corp., engrs., 49 Federal St., Boston, soon takes bids boiler house, steel construction, piping and insulation only. Broad St., for Lynn Gas & Electric Co., 90 Exchange St.

Mass., Quincy—SUPER-SERVICE STATIONS—Sun Oil Co., Mr. Strobell, Construction Division, 711 Statler Bldg., Boston, making plans 2 brick super-service stations, concrete found., one on Southern Artery and Washington St., and other on Quincy Shore Dr. and Vassell St., incl. tanks, pumps, pipe lines, heating, plumbing, electric work, driveways, etc. Private plans.

Mich., Detroit—PLANT—Detroit Lubricator Co., 5842 Trumbull St., plans by R. O. Derrick, Union Guarantee Bldg., plant addition. $37,000.

Mich., Evart—DAIRY—Northland Dairy Co. plans dairy repairs and alterations, incl. drying room. $37,000 with equipment. **Maturity indefinite.** Architect not appointed.

Mich., Pontiac—STORAGE—Wolverine Warehouse Co., Franklin St. at Grand Trunk R.R. tracks, plans repairing and altering storage. Est. about $37,000.

Mich., Saginaw—PLANT—Saginaw Steering Gear Co. plans addition to plant, storage and distribution. $37,000.

Miss., Newton—PLANT—Kraft-Phenix Cheese Co. plans additions to cheese factory. $37,000 with equipment.

Neb., Omaha—BREWERY—Fontenelle Brewing Co., 210 Hickory St., plans 2 story, brick brewery addition. $40,000. Architect not appointed.

N. J., Jersey City—PLANT—U. S. Gypsum Co., 300 West Adams St., Chicago, Ill., plant of recently acquired National Asbestos Mfg. Co., and plans improving same. To exceed $37,000. **Maturity indefinite.**

N. Y., Brooklyn—SERVICE GARAGE, etc.—Joseph P. Day, Inc., 67 Liberty St., New York, plans by Lama & Proskauer, 383 Jay St., 2 story, 100x100 ft., brick service garage, plain found., 40 Brighton 11th St. $40,000 with equipment.

N. Y., Jamaica—SERVICE GARAGE—Kollman Realty Co., 151st St. and Archer Ave., Jamaica, plans by A. MacLean, 153-39 88th Ave., 1 story, brick service garage, 150th St. near Archer Ave. $37,000 with equipment.

N. Y., New York — STORAGE, etc. — Forty-Nine Duane Realty Co., 1860 Bway., plans by G. G. Miller, 10 West 47th St., 2 story, brick storage and showroom, plain found., 49 Duane St. $85,000.

N. Y., New York—POWER PLANT—Sailors Snug Harbor, 262 Greene St., plans by Corbett & MacMurray, 130 West 42nd St., 1 story, 25x87 ft. electric power plant, 255 Greene St. Est. about $40,000 with equipment.

N. Y., Niagara Falls—SERVICE SHOP STORAGE—Kreuger Motor Sales Co., 835 Winslow Ave., through C. F. Obenhack, archt., Gluck Bldg., soon lets general contract heating, plumbing, electrical work, painting, freight elevator, etc., for brick, steel service shop storage building, plain found., 825 Winslow Ave. $45,000. Noted Feb. 19, C. D.—Feb. 27, E. N.-R.

N. Y., Plattsburg — STORAGE, etc. — J. A. Freeman & Son, Plattsburg, plans repairing and altering storage and warehouse. Est. about $37,000. Architect not appointed.

N. Y., Schenectady—PLANT—James E. Lowe & Sons, Inc., general contractors, 243 State St., taking bids complete sprinkler system for printing plant, for Maqua Co., 946 Duane Ave. (subsidiary of General Electric Co.), E. E. Talmadge, c/o General Electric Co., River Rd., Schenectady, engr. Noted Feb. 14, C. D.—Feb. 20, E. N.-R., under "Contracts Awarded."

N. C., Biltmore—MILL—Ashville Lumber Co., c/o W. C. Ziekgraf, Franklin, plans saw and lumber mill. $50,000.

N. C., Greensboro—PLANT—Vick Chemical Co., plans 2 story, brick plant and laboratory alteration, and reconditioning (medicated cough drops to be manufactured) off Wendover Ave. $37,000 or more.

N. D., Grand Forks—GRAIN ELEVATOR—Terminal Elevator Co., 729 Reeves St., plans grain elevator. To exceed $100,000.

O., Cincinnati—PLANT—Merchants Paper Co., J. Brennan, pres., 819 Bway., plans repairing fire damaged plant. Est. about $40,000. Architect not appointed.

O., Niles—PLANT—Iron & Steel Roofing Co., 412 Warren St., plans repairing and altering plant. Est. about $37,000. Architect not appointed.

Okla., Enid—LUMBER PLANT—Long Bell Lumber Co. plans constructing lumber plant. To exceed $50,000. **Maturity indefinite.** Architect not appointed.

Pa., Altoona—PLANT—Brumbaugh Body Co. plans plant addition on Logan Ave. and Plank Rd. $40,000.

Pa., Latrobe — FACTORY — Latrobe Electric Steel Co., 2626 South Ligonier St., making plans raising 1 story, 60x380 ft. present building, putting in new footers, steel windows, ventilating system, new metal building, 2626 South Ligonier St. Private plans.

★ **Pa., Phila.** — PLANT — Supplee-Wills-Jones Milk Co., 1523 North 26th St., plans plant improvement. To exceed $37,000. Part of National Dairy Products Co., 210 Bway., New York. $10,000,000 expansion program.

Pa., Warren and Butler—PLANT—Valvoline Oil Co., E. H. Shepherd, purch. agt., 5th and Butler Sts., Cincinnati, O., plans alterations and improvements to crude oil refinery at Warren, also construction large laboratory at But-

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Industrial Buildings (Continued)

fer. To exceed $37,000. **Maturity soon.** L. Calkins, c/o owner, ch. engr.

Tenn., Memphis—FACTORY—W. W. Robinson of McCallum & Robinson Co., plans by J. T. Wallace, Commerce Title Bldg., 1 story, 120x200 ft., brick, concrete, steel factory, incl. lockers, showers and lunch room for 85 workers, Riverside Blvd., opposite Ford plant along I. C. & R.R. tracks. $50,000. To be leased for 10 years to Globe Union Mfg. Co., Milwaukee, Wis., present Memphis branch, 305 West Trigg St. R. R. Rindfleisch, mgr.

Tex., Henderson — REFINERY — Parade Gasoline Co., Shreveport, La., plans refinery improvements. $275,000.

B. C., North Vancouver—SAWMILL—Glaspie Lumber Co. Ltd., c/o J. H. Brown, mill archt. and engr., 4184 Osler Ave., Vancouver, making plans new sawmill to cut 40,000 ft. per day, also small office and wharf. $50,000.

Ont., Brantford—PLANT—Crown Electrical Mfg. Co. Ltd., J. Trepanier, mgr., plans constructing plant for manufacturing electrical supplies. $50,000.

Ont., Newmarket — PLANT — Davis Leather Co., 23 Huron St. E., plans 3 story, 50x80 ft., brick, steel addition to plant, two 1 story, 26x50 ft., frame buildings, steam heating and sprinkler system, also special tannery equipment. Margison & Babcock, 690 Maclean Bldg., Toronto, engrs.

Ont., Owen Sound—OIL REFINERY—Nead Oil Refineries Ltd., 45 Richmond St. W., Toronto, plans 1 story oil refining plant and distributing base capacity about 1,000 gal. per day, incl. tanks, concrete founds., steel supports, piping, etc., also brick buildings, near water front. $200,000-$300,000.

Ont., Sudbury — DAIRY PLANT — Palm Dairies Ltd., prepares plans constructing dairy plant and will require all equipment. Est. about $40,000.

Que., Montreal—SERVICE STATIONS—Champlain Oil Products Ltd., Sun Life Bldg., purchases 60 lots in St. Mary's Ward for service stations.

Que., Quebec City — ABATTOIR — Quebec Breeders Assn., F. Byrne, pres., making plans constructing abattoir. $100,000.

Que., St. Joseph de Beauce—PLANT—I. L. Vachon making plans constructing door and sash manufacturing plant. $50,000.

Que., Shawinigan Falls—PLANT—Canadian Industries Ltd., Beaver Hall Hill, making plans and takes bids in April, constructing plant. To exceed $100,000.

BIDS ASKED

Calif., Los Angeles—WAREHOUSE—California Hardware Co., 500 East 1st St., taking bids 5 story, 60x125 ft., rein.-con. Class A warehouse, 107 South Rose St. $85,000. Austin & Ashley, Chamber of Commerce Bldg., archts. Noted Feb. 14, C.D.—Feb. 20, E.N.-R.

Calif., Vernon—SHOP—Lane-Wells Corp., 4439 Santa Fe Ave., taking bids from selected list of bidders, 1 story, 72x160 ft., rein.-con. shop building. To exceed $37,500. A. E. Hansen, 832 South Glendale Ave., Glendale, archt.

Colo., Leadville—MINING DEVELOPMENT—See "Contracts Awarded."

Conn., East Hartford—PLANT—National Oil Corp., C. H. Proller, pres., 1265 Main St., Hartford, taking bids pipe lines (buying pipe without competition). Owners' engineers making plans for proposed buildings Riverside Dr. $40,000. Private plans. Noted Feb. 17, C.D.—Feb. 20, E.N.-R.

Conn., Litchfield—POWER PLANT—See "Contracts Awarded."

Conn., New Haven—PLANT, etc.—See "Contracts Awarded."

Ill., South Chicago — WIRE MILL — See "Contracts Awarded."

Mass., Cambridge—FACTORY, etc.—Dewey & Almy Chemical Co., 235 Harvey St., taking bids 2 story, basement, 57x142 ft., brick, steel factory and office, concrete found., Harvey St. To exceed $140,000. H. L. Kennedy, c/o owner, archt. and engr.

Mass., Lynn—POWER PLANT—See "Contracts Awarded."

Mass., South Boston (sta. Boston)—BULK OIL STORAGE PLANT—White Fuel Corp., 900 East 1st St., taking bids bulk oil storage plant, incl. steel storage tanks with concrete foundations, piping, pumps, motors and other equipment on Reserved Channel, G. Dyson, 25 Huntington Ave., Boston, engr.

Mo., St. Louis—OIL PLANT—Great Eastern Oil Co., Rutzer and Merchant Sts., taking bids 1 story, balcony, 30x75 ft. oil plant building addition, concrete, brick, 3rd and Rutger Sts. B. Shapiro, 418 Wainwright Bldg., archt.

New York — GAS and ELECTRIC PLANTS, etc.—See "Contracts Awarded."

N. Y., Brooklyn—STORAGE, etc.—See "Contracts Awarded."

N. Y., Buffalo—DAIRY—Torch Dairy, Inc., 208 Mayville St., Kenmore, taking bids dairy building, 1149 Niagara St. J. Impellitier, 62 Days Park, archt. Noted Feb. 19, C. D.—Feb. 27, E. N.-R.

Que., Asbestos—MINES, etc.—See "Contracts Awarded."

Que., Hull — FACTORY — See "Contracts Awarded."

CONTRACTS AWARDED

★ **Ark., Crossett** — PAPER MILL — Crossett Lumber Co., kraft pulp and paper mill, incl. wood preparing plant, causticizing plant, recovery plant and boiler plant, evaporator plant, diffuser and digester building, screen room, beater room, paper machine room, finishing room, chemical laboratory, office building, on 20 acre site, to Rust Eng. Co., engineers and contractors, Clark Bldg., Pittsburgh, Pa., $4,000,000.

Calif., Eureka—COLD STORAGE UNIT—Halsby & Lax, general contractors, 324 F St., plumbing for rein.-con. cold storage plant, to Moore & Cooke Co., Eureka, for Eureka Ice & Cold Storage Co., 3rd and B Sts., Eureka***electrical work, to Home Electric Co., Eureka***sheet metal, to Moore & Cooke Co., Eureka***painting, to Neilson Bros., Eureka***reinforcing steel and structural steel, to Eureka Boiler Wks., Eureka. Noted Feb. 20, C. D.—Feb. 27, E. N.-R.

Calif., Napa—FACTORY—P. J. Walker Co., general contractors, Sharon Bldg., San Francisco, electrical work for 1 story, concrete factory, to E. G. Wilson, Napa, for Rough Rider Mfg. Co., 172 12th St., San Francisco. Noted Feb. 10, C. D.—Feb. 13, E. N.-R., under "Contracts Awarded."

Calif., Pomona—PLANT—Pomona Pump Co. plant addition, to Stover Bros., Claremont. Est. $37,000.

Calif., Santa Monica—PLANT—Douglas Aircraft Co., 3000 Ocean Park Blvd., 700 tons structural steel for 1 story, entire basement, 300x300 ft., manufacturing plant unit, 3,000 Ocean Park Blvd., to Bethlehem Steel Co., Slauson Ave. and Downey Rd., $53,568. Taylor & Taylor, 803 West 3rd St., Los Angeles, archts. and engrs.

Calif., Stockton—PLANT—Lindgren & Swinerton, general contractors, 225 Bush St., San Francisco, painting cold storage plant, South Center St., to J. F. Ecker, 17 West Poplar St., for National Ice & Cold Storage Co., 85 2nd St., San Francisco; sheet metal, to Miller-Hays Co., 742 East Weber St. Noted Feb. 20, C.D.—Feb. 27, E.N.-R., under "Contracts Awarded."

Calif., Stockton—CREAMERY—T. E. Williamson, general contractor, Box 93, plumbing, sheet metal work for creamery, Fremont St., to A. D. Ray, 735 East Lafayette St., for Blue Ribbon Dairy Farms, 116 East Oak St.***steel sash, to Turner Hardware Co., 24 North American St.***concrete, to A. Sandberg, R.F.D. 2, Box 40-D***reinforcing steel, to Kyle & Co., 346 G St., Fresno. Noted Feb. 26, C. D.—Mar. 5, E. N.-R., under "Contracts Awarded."

Colo., Leadville—MINING DEVELOPMENT—London Deep Mines Co., c/o R. D. Elder, Leadville, mining development, day labor. To exceed $100,000. Owner makes purchases of equipment.

Conn., Ansonia—FACTORY—S. O. & C. Co., 520 Main St., altering and constructing brick, steel plant addition, to H. Wales Lines Co., 134 State St., Meriden. Est. $40,000. S. Firestone, 59 South Avenue, Rochester, N. Y., archt.

Conn., Litchfield — POWER PLANT — Litchfield Electric Light & Power Co., improvements to power and light plant and distribution separate contracts and day labor. Est. about $38,000.

Conn., New Haven—PLANT—New Haven Gas Light Co., 80 Crown St., plant improvements and improving distribution system, here and vicinity, day labor. $108,000. Noted Mar. 2, C.D.—Mar. 5, E.N.-R.

Conn., Putnam—PLANT—E. J. Cross, general contractors, 82 Foster St., Worcester, Mass., reinforcing steel for 1 story plant, to Geo. F. Blake, Inc., 198 Mechanic St., Worcester, Mass., for Putnam Woolen Corp., Putnam***structural steel, to Eastern Bridge & Structural Co., 88 Crescent St., Worcester, Mass. Noted Feb. 21, C. D.—Feb. 27, E. N.-R., under "Contracts Awarded."

Ill., Chicago—FACTORY—Illinois Tool Corp., 2501 North Keeler Ave., general contract 1 story basement, 107x119 ft. brick factory, plain found., to A. S. Low, 510 North Dearborn St., $45,000. Awarded Feb. 25.

★ **Ill., South Chicago**—WIRE MILL—Republic Steel Corp., E. J. Wysor vice pres., and genl. mgr., Republic Bldg., Cleveland, O., constructing 1 story wire mill, by direct labor, and will purchase materials from subsidiary companys. $1,000,000. C. A. Thayer, Repubic Bldg., Cleveland, O., ch. engr.

Kan., Atchison—PLANT—Chemical Foundation, Inc., c/o L. M. Christianson, alcohol plant, separate contracts now being awarded. $100,000. L. M. Christianson, Ames, Ia., engr.

Ky., Lexington—PLANT—Independent Packing Co., constructing plant addition, to Savage Lumber & Mfg. Co., Lexington. Est. $100,000. Noted Jan. 17, C.D.—Jan. 23, E.N.-R.

Md., Baltimore—WAREHOUSE—J. S. Young Co., 2731 Boston St., constructing 5 story warehouse, to Engineering Contg. Co., North and Linden Aves. Est. $75,000. C. M. Anderson, 36 Whitfield Rd., archt.

Mo., St. Louis — FACTORY — Cupples-Hesse Envelope & Lithographing Co., E. H. Harpres., 4173 North Kingshighway Blvd., general contract 2 story, 120x173 ft., rein.-con., brick factory group addition, Penrose St. west of Kingshighway Memorial Blvd., to Gambel Const. Co., 620 Chestnut St. Bids Feb. 15. Noted Feb. 13, C. D.—Feb. 20, E.N.-R.

N. J., Newark—FACTORY—Maltbie Chemical Co., 250 High St., constructing addition to existing factory, High St., to Carlson Co., 80 Walnut St., Montclair, $55,000. Awarded Feb. 22.

N. Y., Brooklyn—STORAGE, etc.—Rockwood & Co., 88 Washington Ave., altering warehouse, 31 Waverly Ave., day labor. $37,000. C. J. Wolfe, 525 58th St., archt. and engr. Noted Feb. 7, C. D.—Feb. 13, E. N.-R.

N. Y., Brooklyn—STORAGE—G. D. McCurdy, North Bellmore, 1 story, 80x220 ft. storage building, 169 Gardner Ave., separate contracts now being awarded. $37,000 with equipment. W. A. Lacerenz, 391 Fulton St., archt. Noted Feb. 7, C.D.—Feb. 13, E.N.-R.

N. Y., Corona—SERVICE GARAGE—R. Brown & J. Robbins, 143-36 Sanford Ave., Flushing, constructing 1 story, brick service garage, Northern and Willets Point Blvds., separate contracts.

N. Y., New York—FACTORY—Schieren Realty Corp., 30 Ferry St., constructing, 5 story, storage and light manufacturing plant, 82 Beekman St., to A. J. Courtmel, Inc., 55 West 42nd St. Est. $37,000. F. P. Kelley, 40 East 49th St., archt. Noted Jan. 22, C.D.—Jan. 30, E.N.-R.

N. Y., New York—STORAGE, etc.—United Dressed Beef Co., 780 1st Ave., altering storage, 421 East 43rd St., separate contracts awarded. $37,000. Sidney Daub, 63 Park Row, archt. Noted Feb. 7, C. D.—Feb. 13, E. N.-R.

N. Y., Niagara Falls—FURNACE BUILDING—W. S. Johnson Building Co., Inc., general contractors, 2532 Hyde Park Bldg., Niagara Falls, structural steel for Furnace Building 30, Buffalo Ave., to McClintic Marshall Corp., Bell and Abby Sts., Buffalo, for Acheson Graphite Corp., Lakewood, O. Noted Oct. 30, C. D.—Nov. 7, E. N.-R., under "Contracts Awarded."

N. C., Raleigh — PLANT — Hanes Dye Co., Winston Salem, constructing plant addition to F. L. Blum & Co., Winston Salem. Est. $37,000 with equipment.

O., East Liverpool — CHINA PLANT — Hall China Co., constructing addition to pottery plant, to Potters Lumber Co., East Liverpool***structural steel, to Pittsburgh Bridge & Iron Wks., Fulton Bldg., Pittsburgh, Pa.***sprinkler system, to Smith & Obey, 6107 Carnegie Ave., Cleveland, B. H. Prack, Martin Bldg., N.S. Pittsburgh, Pa., archt. Noted Feb. 17, C. D.—Feb. 20, E. N.-R.

Pa., Erie—POWER PLANT—Stone & Webster, superv. engrs. and general contractors, 49 Federal St., Boston, Mass., foundation for brick, steel power plant, East Lake Rd., to H. Platt Co., 922 Raspberry St., for Hammermill Paper Co., East Lake Rd., E. R. Mehrend, pres. Bids later for equipment, incl. new 5,000 kw. generator and 280,000 lb. steam boilers carrying 700 lb. pressure. Noted Feb. 6, C. D.—Feb. 13, E. N.-R.

★ **Pa., Meadville**—PLANT—Viscose Co., Marcus Hook, R. H. Crewdson, engr. in charge, general contract 6 story, 104x307 ft., 2 story, 268x315 ft., and 1 and 3 story, 249x338 ft., brick, steel, concrete buildings, and some additional buildings, Vernon Twp., Crawford Co., near here, to Wark & Co., Sun Bldg., Phila., except plumbing, heating, ventilating, air conditioning, electric and power wiring, sprinkler system, elevator equipment, painting, glazing. Est. $1,000,000. Owner does heating and electrical work. Noted Feb. 17, C.D.—Feb. 20, E.N.-R.

Pa., Pittsburgh—WAREHOUSE—Brinker Supply Co., C. H. Brinker, pres. and mgr., 6545 Hamilton Ave., 1 story, basement, 33x75 ft. machinery warehouse, to D. Gittings, 7732 Hamilton Ave. R. M. Reutti, 307 Whitfield Bldg., archt.

★ **Tex., Houston**—PLANT—Champion Paper Co., Hamilton, O., plant on Houston Ship Channel to Morton C. Tuttle Co., 31 St. James St., Boston, Mass. Est. $3,000,000 with equipment. Noted Jan. 31, C. D.—Feb. 6, E. N.-R.

Ont., Sault Ste. Marie—PLANT—Chromium Mining & Smelting Corp., 6 James St. S., Hamilton, constructing Diesel plant for new power house and concentrator, to S. F. K. Canadian Ltd., 1057 Bay St., Toronto; general machinery, to Stephens Adamson Co., 926 Bank of Hamilton Bldg., Toronto.

Que., Asbestos—MINES, etc.—Johns-Manville Co., 22 East 40th St., New York, mines and asbestos works improvements, day labor and separate contracts. To exceed $50,000.

Que., Hull — FACTORY — Canadian Packing Co. Ltd., Chelsea Rd., addition and alterations to killing branch of factory, day labor. $40,000.

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For official proposal advertising see Searchlight Section

†*Federal Government.*